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THE NATIONAL CRITICAL MATERIALS ACT OF 1984

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HEARINGS

BEFORE THE

SUBCOMMITTEE ON TRANSPORTATION,
AVIATION AND MATERIALS

OF THE

COMMITTEE ON
SCIENCE AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

NINETY-NINTH CONGRESS

FIRST SESSION

OCTOBER 8, 10, 1985

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THE NATIONAL CRITICAL MATERIALS ACT OF 1984

TUESDAY, OCTOBER 8, 1985

House of Representatives, Committee on Science and Technology, Subcommittee on Transportation, Aviation and Materials,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:36 a.m., in room 2318, Rayburn House Office Building, Hon. George E. Brown, Jr. (chairman of the subcommittee) presiding.

Mr. Brown. The subcommittee will come to order.

I think I ought to read my opening statement since we have not had a good materials hearing in some time.

Today's hearing is the first of 2 days to consider national efforts in critical materials. In particular, we will be looking closely at the implementation of Title II of Public Law 98-373, the National Critical Materials Act of 1984. Today, we will look at broad materials policy questions. On the second day, we will focus on the important issue of critical materials in South Africa.

Congressional concern for critical materials goes back many years. The oil embargo of the seventies made us all aware of import vulnerabilities with other critical materials such as cobalt, chromium, or manganese. More recently, we have seen the advent of new, advanced materials which will determine in large part the products and industries of the next several decades. Such materials will be vital to the Nation's economic competitiveness as well as to maintaining our strategic strength.

Recognizing this importance, Congress passed a number of laws, including the 1984 Materials Act, to take specific steps to deal with these matters. Unfortunately, despite a few sporadic though apparently well-intentioned efforts, the executive branch in the past 5 years has failed in implementing these laws. For instance, though the 1984 act was signed by President Reagan more than a year ago, he has yet to appoint the three-member National Critical Materials Council or to carry out any of the required programs considered central to the act.

The Federal Government supports almost $1.5 billion in materials R&D spread across 14 different agencies. This research is considered crucial to key Federal policies and programs, including defense, energy, commerce, and transportation. For example, the President's Science Advisor, Dr. Jay Keyworth, has suggested we spend almost $1 billion to develop new leapfrog technologies to make our ailing steel industries internationally competitive. In another example, the success of the multibillion-dollar star wars initiative depends heavily on developing new, key materials. There are other examples as well.

By failing to implement the 1984 act, we have not adequately harnessed the tremendous technological and scientific strength these materials and their use represent. At the Federal level, we have failed to set adequate goals and priorities as well as to set responsibilities for carrying out those goals and priorities. Our mining and basic materials industries are in a ruinous decline with the current economic and competitive atmosphere. Continuing problems in South Africa underscore our import vulnerability for critical materials.

Meanwhile, other nations such as Japan and West Germany implement long-term research programs in advanced and basic materials to promote their industrial competitiveness and relieve their own vulnerabilities. While not representing a general panacea, I believe the 1984 act, if properly implemented, will go far in meeting the problems and opportunities associated with critical materials.

Today, we have a number of witnesses from the Federal Government and the private sector. I hope that we can explore with them these important policy matters and discuss what further steps need to be taken to carry out the intent of this public law.

Now, we will call upon our distinguished ranking minority member, Mr. Lewis, for any comments he may have.

Mr. LEWIS. Thank you, Mr. Chairman.

As you know, the National Critical Materials Act of 1984 which we will be addressing today received broad bipartisan support when it was passed last year. Members on both sides of the aisle recognized the importance of having a well thought out, comprehensive policy to deal with the myriad of issues in this area. These issues cannot be considered in isolation. Management of the stockpile, for example, cannot be addressed without considering the impact of research and technology programs directed at improved processing, recycling, more efficient mining, or at the development of substitute materials.

As you pointed out, Mr. Chairman, the R&D activities alone involve 14 different Government agencies. Moreover, independent research conducted in the private sector is also indirectly supported through tax incentives. The broad range of issues involved in materials policy spans across at least 20 agencies and offices and no Federal agency or entity is responsible for coordinating these efforts to ensure that these programs are providing the maximum possible synergism and are not resulting in costly duplication.

The importance of strategic materials to the economy and to the national security of this Nation has been acknowledged but, unfortunately, largely ignored for many years. This administration has taken steps to address some of these critical issues, first, by attempting to coordinate materials policy through the Cabinet Council on Natural Resources and Environment and, more recently, with the establishment of an advisory committee within the Department of Interior and, also, the reorganization of Comat, the Committee on Materials.

Unfortunately, these actions, though helpful and certainly well intentioned, fail to provide the necessary coordination to tie all of these activities together. I believe this lack of coordination potentially wastes billions of taxpayers' dollars. But of even greater concern to me, it hampers our efforts to effectively deal with our increased dependence on foreign sources for our critical materials.

The Critical Materials Act of 1984 establishes an appropriate framework for the development of an effective national materials policy. I am disappointed that over a year after its enactment, it has not been implemented. I hope that today we will hear that the administration has begun steps to implement this important piece of legislation.

Thank you, Mr. Chairman.

Mr. **Brown**. Thank you very much.

Now, we will call on our first witness, Dr. John P. McTague, who is the Deputy Director of the Office of Science and Technology Policy.

We welcome you here, Dr. McTague. We are not really nearly as mad at you as we may sound sometimes, and we look forward to cooperating closely with you wherever we can.

STATEMENT OF JOHN P. McTAGUE, DEPUTY DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY, EXECUTIVE OFFICE OF THE PRESIDENT, WASHINGTON, DC

Dr. **McTague**. Thank you, Mr. Brown.

We are here today for a reason broader than that implicit in the topic "Materials: National Policy and Management." We are here today because we share an obligation to ensure that the Federal Government adequately addresses its commitment to maintain a national technological base strong enough to sustain any challenge, foreign or domestic, military or economic.

This technology readiness transcends the boundaries between the executive and legislative branches of our Government and has several major components. First and most important are the human resources. We simply must be able to attract, educate, and nurture the best scientists and engineers in the world, regardless of field, fostering a research and learning environment conducive both to individual creativity and interdisciplinary interaction.

The singular and collective value of our scientific talent was surely a lesson drawn from the Manhattan project whose success derived from the joint efforts of physicists, mathematicians, chemists, and engineers from exceedingly diverse disciplinary and geographic backgrounds.

Beyond that, several components that might come under the rubric of technology base and infrastructure are equally essential. Among them are manufacturing engineering excellence to produce high quality products from whatever raw materials are available; telecommunications resources to coordinate all national defense and commercial efforts; a transportation system adequate to the stress of a national emergency situation; and the science and technology knowledge base to undergird them all—manufacturing, telecommunications, and transportation.

Within the executive branch of the Government, operational responsibility for these areas necessary is distributed across nearly every department and agency. Within the Executive Office of the President, the Office of Science and Technology Policy is responsible for assuring that overall Federal science and technology policy adequately responds to national needs.

We are here today also, I am well aware, to talk about legislation, specifically, implementing Public Law 98-373, title II, the National Critical Materials Act of 1984. I understand your concern. We in OSTP take our legislative mandate very seriously. Contained in title II of the National Science and Technology Policy, Organization, and Priorities Act of 1976, it states, in part:

> The office shall—seek to define coherent approaches for applying science and technology to critical and emerging national and international problems and for promoting coordination of the scientific and technological responsibilities and programs of the Federal departments and agencies.

Our frame of reference encompasses research and development and training in various disciplines of science and engineering, including manufacturing engineering, materials science, physics, chemistry, computer science, aeronautics, telecommunications, and advanced weapons, spanning agencies as vastly different from one another as the National Institutes of Health is from the Department of Commerce.

Effective coordination is the single most important aspect of OSTP's mission. We achieve it by taking a broad overview, not be regarding specific fields of disciplines in isolation. The current administration places a high priority on science and technology as evidenced by a very large increase in research and development funding over the last 4 years. It recognizes the inestimable contribution of science and technology to our Nation's well being. Yet, even acknowledging the fluctuation of our national needs, it does not prize any one field of science or technology more highly than the others.

OSTP's existing challenge of coordinating various disciplines and departments is formidable enough; I cannot imagine a scenario in which a separate council were set up within the Executive Office of the President to address each important area or any one of them individually.

The Office of Science and Technology Policy recognizes the importance of tapping the available resources of expert advice and does so regularly in carrying out its advisory, oversight, and coordination responsibilities. We receive general policy guidance from the White House Science Council, a distinguished body of scientists, engineers, and administrators from industry and academe. We often seek advice, both formally and informally, from the National Academies of Science and Engineering. For instance, recently, they performed studies of polymers and of composite materials for us.

The Federal Coordinating Council for Science, Engineering, and Technology is our formal means of interagency coordination. A major committee of the Council is the Committee on Materials, Comat, which I chair. It has an executive committee whose members represent the assistant secretary level of authority in the major departments and agencies involved in materials, along with several interagency committees in such important areas as ceramics, rapid solidification, and composites. Its executive secretary, Dr. Darrell Reneker, of the National Bureau of Standards has extensive experience in research and administration of materials programs. He spends more than half of his time at OSTP working solely on Comat matters.

By virtue of its organization and experience, OSTP is uniquely qualified to ensure an appropriate, coordinated materials program within the Federal Government and to view it in the context of other Federal research and development activities. With these capabilities, is has observed effectively the spirit of the National Critical Materials Act.

Can and should we do better? Perhaps, and perhaps establishing a National Critical Materials Council is one way to make the desired improvements. However, it seems to me unwise to balkanize the coordinating efforts of OSTP by creating separate councils for every disciplinary constituent we serve. In an concerned, in other words, that implementation of the Council will eclipse the other equally vital areas of science and technology also properly under the purview of OSTP and also properly considered essential components of national security. What of the life sciences, telecommunications, physical sciences, engineering, et cetera? Are they considered less critical than materials?

Nevertheless, we are aware that Congress has spoken, and we will implement the Council. The President has decided to announce a Council, and he will do so.

The administration is striving to limit the growth of Government. If one disciplinary council leads to others, as I am convinced it will, the effect will be to increase the bureaucracy but, more important, it will decrease the overall cohesion we at OSTP have worked so hard to form and inevitably create a claque of special pleaders. Is a babble of dissonant voices preferable to a reasoned prioritization?

Thank you, Mr. Chairman.

[The prepared statement of Dr. McTague follows:]

PROPOSED TESTIMONY OF DR. JOHN P. McTAGUE
DEPUTY DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY
EXECUTIVE OFFICE OF THE PRESIDENT

BEFORE THE UNITED STATES HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY
SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS

HEARINGS ON MATERIALS: NATIONAL POLICY AND MANAGEMENT

OCTOBER 8, 1985

MR. BROWN AND MEMBERS OF THE SUBCOMMITTEE:

WE ARE HERE TODAY FOR A REASON BROADER THAN THAT IMPLICIT IN THE TOPIC "MATERIALS: NATIONAL POLICY AND MANAGEMENT." WE ARE HERE TODAY BECAUSE WE SHARE AN OBLIGATION TO ENSURE THAT THE FEDERAL GOVERNMENT ADEQUATELY FULFILLS ITS COMMITMENT TO MAINTAIN A NATIONAL TECHNOLOGICAL BASE STRONG ENOUGH TO SUSTAIN ANY CHALLENGE, FOREIGN OR DOMESTIC, MILITARY OR ECONOMIC.

THIS TECHNOLOGY READINESS TRANSCENDS THE BOUNDARIES BETWEEN THE EXECUTIVE AND LEGISLATIVE BRANCHES OF OUR GOVERNMENT AND HAS SEVERAL MAJOR COMPONENTS. FIRST AND MOST IMPORTANT ARE THE HUMAN RESOURCES. WE SIMPLY MUST BE ABLE TO ATTRACT, EDUCATE, AND NURTURE THE BEST SCIENTISTS AND ENGINEERS IN THE WORLD, REGARDLESS OF FIELD--FOSTERING A RESEARCH AND LEARNING ENVIRONMENT CONDUCIVE BOTH TO INDIVIDUAL CREATIVITY AND INTERDISCIPLINARY INTERACTION. THE SINGULAR AND COLLECTIVE VALUE OF OUR SCIENTIFIC TALENT WAS SURELY A LESSON DRAWN FROM THE MANHATTAN PROJECT, WHOSE SUCCESS DERIVED FROM THE JOINT EFFORTS OF PHYSICISTS, MATHEMATICIANS, CHEMISTS, AND ENGINEERS FROM EXCEEDINGLY DIVERSE DISCIPLINARY AND GEOGRAPHIC BACKGROUNDS.

BEYOND THAT, SEVERAL COMPONENTS THAT MIGHT COME UNDER THE RUBRIC OF "TECHNOLOGICAL BASE AND INFRASTRUCTURE" ARE EQUALLY ESSENTIAL, CHIEF AMONG THEM:

> MANUFACTURING ENGINEERING EXCELLENCE TO PRODUCE HIGH QUALITY PRODUCTS FROM WHATEVER RAW MATERIALS ARE AVAILABLE;
>
> TELECOMMUNICATIONS RESOURCES TO COORDINATE ALL NATIONAL DEFENSE AND COMMERCIAL EFFORTS;
>
> A TRANSPORTATION SYSTEM ADEQUATE TO THE STRESS OF A NATIONAL EMERGENCY SITUATION; AND
>
> THE SCIENCE AND TECHNOLOGY KNOWLEDGE BASE TO UNDERGIRD THEM ALL--MANUFACTURING, TELECOMMUNICATIONS, AND TRANSPORTATION.

WITHIN THE EXECUTIVE BRANCH OF GOVERNMENT, OPERATIONAL RESPONSIBILITY FOR THESE AREAS NECESSARILY IS DISTRIBUTED ACROSS NEARLY EVERY DEPARTMENT AND AGENCY. WITHIN THE EXECUTIVE OFFICE OF THE PRESIDENT, THE OFFICE OF SCIENCE AND TECHNOLOGY POLICY (OSTP) IS RESPONSIBLE FOR ASSURING THAT OVERALL FEDERAL SCIENCE AND TECHNOLOGY POLICY ADEQUATELY RESPONDS TO NATIONAL NEEDS.

WE ARE HERE TODAY ALSO--I AM WELL AWARE--TO TALK ABOUT LEGISLATION, SPECIFICALLY IMPLEMENTING PUBLIC LAW 98-373, TITLE II, THE NATIONAL CRITICAL MATERIALS ACT OF 1984. I UNDERSTAND YOUR CONCERN. WE IN OSTP TAKE OUR LEGISLATIVE MANDATE VERY SERIOUSLY. CONTAINED IN TITLE II OF THE NATIONAL SCIENCE AND TECHNOLOGY POLICY, ORGANIZATION, AND PRIORITIES ACT OF 1976, IT STATES, IN PART:

> THE OFFICE SHALL . . . SEEK TO DEFINE COHERENT APPROACHES FOR APPLYING SCIENCE AND TECHNOLOGY TO CRITICAL AND EMERGING NATIONAL AND INTERNATIONAL

PROBLEMS AND FOR PROMOTING COORDINATION OF THE SCIENTIFIC AND TECHNOLOGICAL RESPONSIBILITIES AND PROGRAMS OF THE FEDERAL DEPARTMENTS AND AGENCIES . . ."

OUR FRAME OF REFERENCE ENCOMPASSES RESEARCH AND DEVELOPMENT AND TRAINING IN VARIOUS DISCIPLINES OF SCIENCE AND ENGINEERING, INCLUDING MANUFACTURING ENGINEERING, MATERIALS SCIENCE, PHYSICS, CHEMISTRY, COMPUTER SCIENCE, AERONAUTICS, TELECOMMUNICATIONS, AND ADVANCED WEAPONS, SPANNING AGENCIES AS VASTLY DIFFERENT FROM ONE ANOTHER AS THE NATIONAL INSTITUTES OF HEALTH IS FROM THE DEPARTMENT OF COMMERCE.

EFFECTIVE COORDINATION IS THE SINGLE MOST IMPORTANT ASPECT OF OSTP'S MISSION. WE ACHIEVE IT BY TAKING A BROAD OVERVIEW, NOT BY REGARDING SPECIFIC FIELDS OR DISCIPLINES IN ISOLATION. THE CURRENT ADMINISTRATION PLACES A HIGH PRIORITY ON SCIENCE AND TECHNOLOGY, AS EVIDENCED BY A 30 PERCENT INCREASE IN RESEARCH AND DEVELOPMENT FUNDING OVER THE LAST FOUR YEARS. IT RECOGNIZES THE INESTIMABLE CONTRIBUTION OF SCIENCE AND TECHNOLOGY TO OUR NATION'S WELL-BEING. YET EVEN ACKNOWLEDGING THE FLUCTUATION OF OUR NATIONAL NEEDS, IT DOES NOT PRIZE ANY ONE FIELD OF SCIENCE MORE HIGHLY THAN THE OTHERS. OSTP'S EXISTING CHALLENGE OF COORDINATING VARIOUS DISCIPLINES AND DEPARTMENTS IS FORMIDABLE ENOUGH; I CANNOT IMAGINE A SCENARIO IN WHICH A SEPARATE COUNCIL WERE SET UP WITHIN THE EXECUTIVE OFFICE OF THE PRESIDENT TO ADDRESS EACH IMPORTANT ACTIVITY, OR ANY ONE OF THEM INDIVIDUALLY.

The Office of Science and Technology Policy recognizes the importance of tapping the available resources of expert advice and does so regularly in carrying out its advisory, oversight, and coordination responsibilities. We receive general policy guidance from the White House Science Council, a distinguished body of scientists, engineers, and administrators from industry and academe. We often seek advice, both formally and informally, from the National Academies of Science and Engineering. For instance, recently they performed studies of polymers and of composite materials for us.

The Federal Coordinating Council for Science, Engineering and Technology (FCCSET) is our formal means of interagency coordination. A major committee of the Council is the Committee on Materials (COMAT), which I chair. It has an Executive Committee, whose members represent the Assistant Secretary level of authority in the major departments and agencies involved in materials, along with several interagency committees in such important areas as ceramics, rapid solidification, and composites. Its Executive Secretary, Dr. Darrell Reneker of the National Bureau of Standards, has extensive experience in research and administration of materials programs. He spends more than half of his time at OSTP, working solely on COMAT matters.

By virtue of its organization and experience, OSTP is uniquely qualified to ensure an appropriate, coordinated materials program within the Federal Government, and to view it in the context of other Federal research and development activities. With these capabilities it has observed effectively the spirit of the National Critical Materials Act. Can and should we do better? Perhaps, and perhaps establishing a National Critical Materials Council is one way to make the desired improvements. However, it seems to me unwise to Balkanize the coordinating efforts of OSTP by creating separate councils for every disciplinary constituent we serve. I am concerned, in other words, that implementation of the Council will eclipse the other equally vital areas of science and technology also properly under the purview of OSTP. What of the life sciences, telecommunications, physical sciences, engineering, etc. . . . are they considered less "critical" than materials?

The Administration is striving to limit the growth of government. If one disciplinary council leads to others, as I am convinced it will, the effect will be to increase the bureaucracy, but more important it will decrease the overall cohesion we at OSTP have worked so hard to form, and inevitably create a claque of "special pleaders." Is a babble of dissonant voices preferable to a reasoned prioritization?

####

Mr. **Brown**. Thank you, Dr. McTague.

Mr. Lewis, do you have any questions?

Mr. **Lewis**. Just a few, Mr. Chairman.

Dr. McTague, can you tell me why it has taken so long to establish the National Critical Materials Council?

Dr. **McTague**. Up until, I guess it was the past week—I am sorry I am not current on facts because I have been out of the country until last night—but my understanding was that there was not an appropriation bill up until the most recent time period.

Mr. **Lewis**. There has been no appropriation for the Council at all?

Dr. **McTague**. That is correct.

Mr. **Lewis**. That is what you tell me. You made some mention right toward the end on the implementation of the Council, but I would like to point out that OSTP may cover all science but materials issues encompass issues that are not science issues. Stockpiling is an example. Can you tell me why we didn't have a budget for the Council?

Dr. **McTague**. It wasn't appropriated, but it also was not requested in the administration budget.

Mr. **Lewis**. Do you know why it wasn't requested?

Dr. **McTague**. I don't know precisely, but I would expect because it was assumed that the major duties of the Council were in fact being performed jointly by the Office of Science and Technology Policy and the Department of Interior and that duplication was involved.

Mr. **Lewis**. Was this brought out during the process of the trail of the legislation through the various committees? Are you aware?

Dr. **McTague**. I am not aware that it was brought up in any committees.

Mr. **Lewis**. I think it is interesting that Congress passed legislation and somebody decided it wasn't necessary to implement it or even request an appropriation.

Dr. **McTague**. From my own perspective, it is not correct that it was not desired to implement it. I personally have spent a significant fraction of my time during the past year working on reorganizing the interagency Committee on Materials precisely because I consider it to be very important.

Mr. **Lewis**. Well, it must be very important. The former chairman of this subcommittee, Mr. Glickman from Kansas, and I sent a letter asking why the Council had not been implemented and when it would be. We are still waiting for an answer. It must have been very important. And that is the same attitude, I guess, that——

Dr. **McTague**. Was that letter sent to the Office of Science and Technology Policy?

Mr. **Lewis**. It was sent to the proper office, yes, sir. And I guess what I am concerned about is that that seems to be the same attitude as to appointing the Council in the first place. If you assume you don't need it, you don't appropriate money for it, so you don't appoint the people, and you don't answer the communications.

I think we should be more concerned about what Congress does and does not do as far as passing legislation. It just seems to me that somebody over in the bureaucracy makes a decision that the heck with that, we will just do what we want to do anyway. That concerns me, particularly when we have a critical materials problem that could be facing us like we might encounter here over the next 6 months to 1 year.

I have no further questions or comments, Mr. Chairman.

Mr. **Brown**. Thank you very much, Mr. Lewis.

I am not sure just what line of questioning would elicit the answers we really need from you, Dr. McTague. You really expect us to believe that OSTP is going to serve as the coordinator for each of the critical areas of science and technology that pose problems for the Nation today? You have listed many of them. Materials is only one; automated manufacturing, telecommunications, and so on.

The Congress has been seeking for years to have the development of a coordinated focus for achieving adequate policy direction, and we do that with legislation such as this act. We get nowhere. I don't think the problem is with OSTP, but I am not sure just where it is.

Would you, in a spirit of cooperation, tell us where you think it is? Is it directly in the Office of the President?

Dr. **McTague**. The function of coordinating the various agency activities that involve research and development, science and technology, clearly lies in the Office of Science and Technology Policy.

Mr. **Brown**. Well, you cited the language there, and we intended to provide that that office should have that kind of coordinating function, but at a level which would make sure that all of the various aspects in science and technology so important to the national welfare were adequately being considered. Now, in the last 5 years, you have actually had a reduction in staff, and the office wasn't doing the job before then. Now, all of a sudden, you think you are going to start doing it.

Dr. **McTague**. I am not sure that it is a matter of numbers, but in fact our staff size at present is approximately what it was 5 years ago when you take into account all of the detailees that we use. Approximately half the staff of our office is on detail from other agencies.

Mr. **Brown**. So, your staff has gone down 50 percent, but you are making it up with detailees?

Dr. **McTague**. That is correct.

Mr. **Brown**. You are to be applauded for your ingenuity, if nothing else.

Dr. **McTague**. There is also, Congressman, an advantage, I believe to having detailees present in the office for relatively limited periods of time. They introduce a fresh perspective, and they often have degrees of specialization that are needed only for short-time periods. So, I think we are very well served by our detailees.

However, that isn't the real question, I don't think. The real question is more is it possible to have effective coordination without line authority. I think that is the real question.

We are a policy office. We are an office that gives advice and that coordinates. We cannot order people to do things. We do not have line authority. The only line authority that has overview over all of the research and development activities of the Government rests in the hands of the President. That happens to be the structure of our system.

In most of the industrialized countries, this rests in a ministry science and technology.

Mr. **Brown**. Well, you have correctly set forth the nature of our constitutional government. I think in large part effective coordination requires executive action. You can't do it in the Office of Science and Technology Policy, but you can alert the Office of the President, of which you are a part, to those critical areas which require more effective action than has been taking place. Hopefully, that will be done in cooperation with the Congress which has identified the materials area as one of those areas.

You don't disagree with that; you just haven't done anything about it.

Dr. **McTague**. We may or may not have done enough, but from my own perspective, I wouldn't say that we have done nothing. If we have done nothing, I have wasted a large fraction of my time during the last year. Perhaps that is true.

With respect to the earlier question of authority versus coordinating responsibility, I should also add that although we do not have explicit line authority, we have a certain amount of moral or immoral authority, depending on how you want to look at it, by virtue of where our office rests and also by virtue of the close cooperation we have with the Office of Management and Budget in formulating budgets and, in particular, in looking at budgets across agencies. This is particularly important in the area of materials which pervades almost every major agency and some minor agencies of the Federal Government.

Mr. **Brown**. Well, much as I admire what you have done over there, Dr. McTague, your response and your testimony this morning is unsatisfactory from my standpoint, but I don't blame you personally for it.

Dr. **McTague**. As I stated in the testimony, the President has decided to implement the Council.

Mr. **Brown**. That is very generous of him since we enacted a law requiring him to do that 1 year ago, and you are not in a position yet to tell us when he is going to do it, are you?

Dr. **McTague**. No; I am not, but I believe it is in the very short term.

Mr. **Brown**. Then, I will hold my breath until we hear from him. Thank you very much for your testimony.

Our next witness will be Dr. Robert Broadbent, Assistant Secretary of the Interior for Water and Science.

Did I call you Dr. Broadbent?

Mr. **Broadbent**. Yes.

Mr. **Brown**. I won't apologize for that. You have an even more distinguished role, however, than merely being a doctor.

Mr. **Broadbent**. Thank you very much.

Mr. **Brown**. We welcome you here this morning.

STATEMENT OF ROBERT N. BROADBENT, ASSISTANT SECRETARY FOR WATER AND SCIENCE, U.S. DEPARTMENT OF THE INTERIOR

Mr. **Broadbent**. Mr. Chairman and members of the committee, it is a distinct pleasure for me to be able to appear before you today to describe the responsibilities and activities of the Department of the Interior with respect to national materials policy and management.

Mineral fuels and strategic mineral materials were of major concern to the Department of the Interior even prior to World War I. The quantities and qualities of materials to be stockpiled for national defense were initially determined by the Secretaries of War, Navy, and Interior, acting through then Army and Navy Munitions Boards. This specific responsibility was reaffirmed in the Strategic and Critical Materials Stock Piling Act of 1946. The 1979 amendments to that Act placed the responsibility on the President, whereupon, by executive order, he assigned specific responsibilities for material research mandated by section 8(a) of the act to the Secretary of the Interior.

Secretary Hodel has made clear to us in the Interior Department that one of his five major policy themes is, and I quote, "enhancing America's ability to meet our energy and material needs with domestic resources." This policy is consistent with concern with the adequacy of the Nation's resources to sustain economic growth and promote the national defense which has motivated the national scientific and technological investigations of our bureaus and agencies from the first days of their establishment.

We have restructured the program activities within the Bureau of Mines to enhance its ability to collect information on mineral activities worldwide and to assess supply implications for the United States. The extent to which the free world's mineral resources may be recovered in an economic fashion is being assessed in our Minerals Availability Program in the Bureau of Mines.

To improve materials data gathering, Interior entered into a Memorandum of Understanding with the Department of State, spelling out clearly the expected activities of State in this expanded effort.

The Bureau of Mines also serves as the Department's lead in materials research. In addition, since joining the interdepartmental process of reviewing multilateral development bank loan applications, the Department of the Interior has improved the economic and technical understanding of proposed mineral developments and their role in world markets.

In March 1983 the President established the exclusive economic zone that augmented the area under U.S. economic control by adding the vast living and nonliving resources contained in the 4 billion acres covered by the ocean waters adjacent to the shores of the continental United States and its territories.

The Department of Interior, through the U.S. Geological Survey and the Minerals Management Service, in cooperation with NOAA of the U.S. Department of Commerce, is currently mapping and identifying the resources in that vast ocean area. Specifically, we are currently assessing the cobalt crust deposits near Hawaii and complex polymetallic sulfide deposits in the Gorda Ridge area off our west coast, sometimes in joint efforts with foreign researchers. The Minerals Management Service is formulating leasing regulations for the eventual mining of these and other deposits in the EEZ.

Materials such as nickel, cobalt, chromium, manganese, tungsten, molybdenum, and platinum, just to name a few, were identified as highly important to our national security as long ago as World War I. Ever since then, the U.S. Geological Survey and the Bureau of Mines, working in cooperation with foreign governments and companies in the private sector, have been cataloging worldwide mineral deposits.

The Strategic and Critical Minerals Program of the U.S. Geological Survey provides a continuing assessment of the Nation's endowment of strategic minerals and a continuing analysis of the world's mineral resources for the formulation of national minerals policy and the identification of secure sources of minerals that are critical to the security, industrial production, and economic well-being of this country and that are vulnerable to disruption in supply.

The Bureau of Mines has long been engaged in developing methods of extracting minerals from lower grade ores, making new and improved materials and alloys and also developing means of recycling materials that would otherwise be lost as waste. For example, when we look at the important uses of titanium, a metal with a strength/weight advantage over aluminum of 3 to 1, a metal used not only in defense and aerospace applications but also in critical civilian applications, we remember that it was the Bureau of Mines that did the research that elevated titanium from a laboratory curiosity to a defense necessity.

Likewise, when the U.S. Navy needed zirconium for the nuclear reactor from the first nuclear submarine, the Navy came to the Bureau of Mines which made zirconium by essentially the same process that the Bureau had developed for titanium.

With respect to the National Critical Materials Council, as indicated by Dr. McTague, it is the intent of the administration to appoint the Council, and we expect it to be done in the very near future. In this regard, the Department of Interior intends to work very closely with the Council in carrying out its broad responsibilities.

Let me say in closing that Secretary Hodel has asked me to assure you of our complete cooperation in supplying any information that you find helpful in the discharge of your responsibilities, and I will endeavor at this time to answer any questions.

Thank you very much, Mr. Chairman.

[The prepared statement of Mr. Broadbent follows:]

Statement of the Honorable Robert N. Broadbent
Assistant Secretary--Water and Science
U.S. Department of the Interior
Washington, D.C. 20240

Before the Subcommittee on Transportation, Aviation and Materials
Committee on Science and Technology
U.S. House of Representatives
Washington, D.C. 20515

October 8, 1985

Mr. Chairman, Members of the Committee, Ladies and Gentlemen:

It is a distinct pleasure for me to appear before you today to describe the responsibilities and activities of the Department of the Interior with respect to national materials policy and management. Our Department has been in the forefront of Federal efforts to expand supplies of materials for the economy and for the national security for more than one hundred years. Some of our constituent bureaus have a still longer history.

Mineral fuels and strategic mineral materials were of major concern to the Department even prior to World War I. The quantities and qualities of materials to be stockpiled for national defense were initially determined by the Secretaries of War, Navy, and the Interior acting through the then Army and Navy Munitions Board. This specific responsibility was reaffirmed in the Strategic and Critical Materials Stock Piling Act of 1946. The 1979 amendments to that Act placed the responsibility in the President, whereupon by Executive Order 12155 he assigned specific responsibility for mineral research mandated by Section 8(a) of the Act to the Secretary of the Interior. Section 8(a), which reads as follows, is very broad:

MATERIALS DEVELOPMENT AND RESEARCH

SEC. 8.(a)(1) The President shall make scientific, technologic, and economic investigations concerning the development, mining, preparation, treatment, and utilization of ores and other mineral substances that (A) are found in the United States, or in its territories or possessions, (B) are essential to the national defense, industrial, and essential civilian needs of the United States, and (C) are found in known domestic sources in inadequate quantities or grades.

(2) Such investigations shall be carried out in order to--

(A) determine and develop new domestic sources of supply of such ores and mineral substances;

(B) devise new methods for the treatment and utilization of lower grade reserves of such ores and mineral substances; and

(C) develop substitutes for such essential ores and mineral products.

(3) Investigations under paragraph (1) may be carried out on public lands, with the consent of the owner, on privately owned lands for the purpose of exploring and determining the extent and quality of deposits of such minerals, the most suitable methods of mining and beneficiating such minerals, and the cost at which the minerals or metals may be produced.

The generally accepted meaning of the term "materials" includes renewable materials such as timber and wood products; animal fibers such as wool; vegetable fibers such as cotton; and the entire spectrum of mineral materials, including the mineral fuels. Petroleum and natural gas are not only fuels but also the starting point for the petrochemicals that in turn are the raw materials for America's plastics industry, which in the past 35 years has increased production from a 1950 level of 1 million tons per year to a current level in excess of 22 million tons per year.

Over the years, the Department of the Interior has used its authority to encourage the wise use of our Nation's resources, while endeavoring to be a good steward of the Nation's resources and mindful of the injunction of the public lands laws to facilitate multiple use and sustained yield. And the Department is conscious, not only of the needs of this generation, but also those that will follow. Secretary Hodel has made clear to us in the Interior Department that one of his five major policy themes is "enhancing America's ability to meet our energy and mineral needs with domestic resources." This policy is consistent with concern with the adequacy of the Nation's resources to sustain economic growth and promote the national defense, which has motivated the scientific and technological investigations of our bureaus and agencies from the first days of their establishment.

We have restructured the program activities within the Bureau of Mines to enhance its ability to collect information on mineral activities worldwide and to assess supply implications for the United States. The extent to which the free world's mineral resources may be recovered in an economic fashion is being assessed in our Minerals Availability Program of the Bureau of Mines.

To improve materials data gathering, Interior entered into a Memorandum of Understanding with the Department of State, spelling out clearly the expected activities of State in this expanded effort.

The Bureau of Mines also serves as the Department's lead in materials research. In addition, since joining the interdepartmental process of reviewing multilateral development bank loan applications, the Department of the Interior has improved the economic and technical understanding of proposed mineral developments and their role in world markets.

On March 10, 1983, President Reagan established the Exclusive Economic Zone that augmented the area under U.S. economic control by adding the vast living and non-living resources contained in the 3.9 billion acres covered by the ocean waters adjacent to the shores of the continental United States and its territories. The Department of the Interior, through the U.S. Geological Survey and the Minerals Management Service, and in cooperation with the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce, is currently mapping and identifying the resources in that vast ocean area. Specifically, we are currently assessing the cobalt crust deposits near Hawaii and complex polymetallic sulfide deposits in the Gorda Ridge area off our West Coast, sometimes in joint efforts with foreign researchers. The Minerals Management Service is formulating leasing regulations for the eventual mining of these and other deposits in the EEZ.

The Bureau of Land Management is involved in energy and mineral resource assessment, including the development of the geology, energy and mineral system. Mineral resource assessment constitutes one input into the

Bureau's land use decisions. These decisions include the validation of mining claims, sale of saleable materials and leasing of on-shore Federal energy and mineral resources.

Materials such as nickel, cobalt, chromium, manganese, tungsten, molybdenum and platinum, just to name a few, were identified as highly important to our national security as long ago as World War 1. Ever since then, the U.S. Geological Survey and the Bureau of Mines, working in cooperation with foreign governments and companies in the private sector, have been cataloging worldwide mineral deposits. In response to President Reagan's April 1982 National Materials and Minerals Program Plan, the Geological Survey and the Bureau of Mines have, together with mineral-resource agencies from Australia, Canada, West German, South Africa, and the United Kingdom, formed the cooperative International Strategic Minerals Inventory in order to more efficiently gather and report mineral-deposit information.

The Strategic and Critical Minerals Program of the USGS provides a continuing assessment of the Nation's endowment of strategic minerals and a continuing analysis of world mineral resources, for the formulation of national minerals policy and the identification of secure sources of minerals that are critical to the security, industrial production, and economic well-being of the country and that are vulnerable to disruptions in supply.

The program has three principal components: (1) commodity resource information and analysis, which includes acquiring, managing, and analyzing commodity data, applying empirical and genetic mineral deposit models to the analysis of commodity data, and developing grade and tonnage models of mineral deposits; (2) regional resource information and analysis, which includes developing resources analysis methodologies; and (3) basic research in support of the program's commodity and regional resource information and analysis responsibilities.

The USGS also conducts research on the origin and the geological, geochemical, and geophysical expression of mineral-deposit systems. The objectives are to develop concepts and techniques to improve the capability of identifying and evaluating mineral resources. To achieve these objectives, field and laboratory studies are directed toward understanding the processes by which mineral deposits form and developing new technology and models to assess the mineral-resource potential in areas of concealed deposits.

The Bureau of Mines has long been engaged in developing methods of extracting minerals from lower grade ores, making new and improved materials and alloys, and also developing means of recycling materials that would otherwise be lost as waste. For example, when we look at the important uses of titanium--a metal with a strength/weight advantage over aluminum of 3-to-1, a metal used not only in defense and aerospace applications but also in critical civilian applications--we remember that it was the Bureau of Mines that did the research that elevated titanium from a laboratory curiosity to a defense necessity. Likewise, when the U.S. Navy needed zirconium for the nuclear reactor from the first nuclear submarine, the "Nautilus," the Navy came to the Bureau of Mines, which made zirconium by essentially the same process that the Bureau had developed for titanium. In subsequent years, these and other technologies were transferred by the Bureau to the private sector, creating employment and establishing industries that are now essential components of our defense industrial base. I note that Mr. Robert C. Horton, the Director of the Bureau of Mines, has been asked to testify before your Committee on October 10, and I have asked him to include in his statement more detailed descriptions of the information collection and analysis, mining and materials research, and mineral land evaluation activities of the Bureau, the latter done in conjunction with the U.S. Geological Survey.

With respect to the National Critical Materials Council established by the National Critical Materials Act of 1984, the President has decided to establish the Council and its membership will be announced shortly. The fundamental purpose of the Council will be to coordinate materials policy and programs among the various federal agencies. In this regard, the Department of the Interior intends to work very closely with the Council in carrying out its responsibilities.

Let me say in closing that Secretary Hodel asked me to assure you of our complete cooperation in supplying any information that you find helpful in the discharge of your responsibilities, and I will endeavor at this time to respond to such questions as your may wish to pose.

Mr. **Brown**. Thank you, Mr. Broadbent.

Mr. Lewis.

Mr. **Lewis**. Thank you, Mr. Chairman.

Mr. Broadbent, I just want to ask you the same question I asked the previous witness. Can you tell us why it has taken so long to appoint this Council?

Mr. **Broadbent**. As I looked at the Council and when we first looked at it after its passage, I would think that probably—the mandate of the Council is broad, as probably you people recognize who were responsible for passing the bill. Just the very problem of getting a consensus in the administration took a little time. I think we have reached that consensus. We recognize the mandate that was given to us by Congress, and we are moving ahead with the appointment of the Council.

That is not a very satisfactory answer, but in my short 4 years in Government, it seems like nothing much happens in 1 year.

Mr. **Lewis**. Well, I would think that your concern is with the increasing domestic production, and this, of course, isn't the concern of OSTP, so I would say this is a good reason for the Council.

Mr. **Broadbent**. Yes.

Mr. **Lewis**. That was one of the reasons why the Council was formed.

Mr. **Broadbent**. The Department of the Interior consistently supported the formation of the Council.

Mr. **Lewis**. We are aware of that, and we appreciate that. What do you see as the Department of the Interior's role with respect to the Council?

Mr. **Broadbent**. Well, the biennial report, I think, to a large part, is going to have to be dependent upon information that is available in the Bureau of Mines. I think the information resources that the Bureau of Mines has will be invaluable to us in providing the technical work that would have to be done to meet the mandate of the law.

I recognize that there is a scientific purpose to this law, but there are also a lot of very practical issues that have to be dealt with, in my opinion, under the Critical Materials Council. I would suspect that the Department of the Interior, with the U.S. Geological Survey, the Bureau of Land Management, the resource assessment that is presently going on in much of our country as we examine what natural resources we have, the assessment work that is particularly going on in the exclusive economic zone, our interest in the stockpile, our technical interest in the stockpile, and the stockpile goals would indicate to us that we would hope to be major players in the Critical Materials Council.

Mr. **Lewis**. Were you briefed before you came to the subcommittee hearing that we would be concerned about why the Critical Materials Council has not been formed?

Mr. **Broadbent**. Was I briefed yesterday or——

Mr. **Lewis**. At any time.

Mr. **Broadbent**. Before this hearing, no, I haven't been briefed by anybody but my own staff.

Mr. **Lewis**. Inasmuch as this series of hearings is on critical materials, it would seem that our concern for that Council appointments would be one. Do you have any idea—you say it will be appointed shortly. Everyone's definition of shortly is different. Would you say by the end of the year? By April 1?

Mr. **Broadbent**. No, I would guess in the next couple of weeks.

Mr. **Lewis**. Thank you.

Mr. **Broadbent**. That is my estimate. I thought it would be in the last couple of weeks, but——

Mr. **Lewis**. I thought it would be in the last couple of months. Thank you.

Thank you, Mr. Chairman.

Mr. **Brown**. Thank you, Mr. Lewis.

We recognize that you in the Department have been supporters of the program embodied in this legislation, and we can't aim any criticism at you for the delay in the appointment of the Council, and we don't intend to do that. We raised a question with Dr. McTague as to how he was so confident that OSTP could do everything required by this act in view of their budgetary and staff problems. I have a little curiosity about the work being done in your agency, particularly in the Bureau of Mines where I note that you have suffered a very serious cut in budget. For 1986, you have requested about a 30-percent cut in the funding for the Bureau of Mines.

I wonder what this implies in terms of your ability to carry out the admittedly important materials programs that you have described in your own testimony.

Mr. **Broadbent**. Well, I don't think I could indicate to you that a cut in budget won't impact part of our program. When we looked at the priorities for the Bureau of Mines, we tried not to touch the minerals availability/data gathering portions of the program because we felt that it was important to Congress as well as to many agencies in the Government and outside industry as well.

Mr. **Brown**. You are not going to touch something politically volatile like mine safety or something like that?

Mr. **Broadbent**. No; that is one that we took a crack at, yes, sir. The main reductions in the Bureau of Mines budget were in research and in the Minerals Institute Program. Candidly, we had to look at our priorities, and when we looked at it, we made a judgment that we would like to preserve these programs and maybe not the rest. I mean, if there was going to be a budget, it has been obvious to me that maybe Congress has a different idea, and if they do, we are going to implement it.

Mr. **Brown**. Well, you are correct. You have taken a lot of money out of minerals research and I don't know that this committee will have too much of an impact on your budgetary process, but we don't like that because we think research is very important.

Mr. **Broadbent**. I think some part of Science and Technology recommended that that be put back in the Bureau of Mines program for the 1986 budget.

Mr. **Brown**. Well, our concern with your research activities with the general problems of critical materials and the need to plan well in advance for substitute sources, alternative methods of meeting needs, is not a new issue in this committee, as I am sure you know. We have been concerned about it for at least 15 years that I know about and maybe longer. We will continue to be concerned about it. There is no easy or quick solution to it. It seems to be very frustrating sometimes to try to even get a coordinated approach to it, but I hope that you are correct that we will see the appointment of this Council in the very near future and that this can be the beginnings of a new approach which will help us to solve this problem.

I don't have any further questions of you, Mr. Broadbent.

Mr. **Broadbent**. Thank you very much, Mr. Chairman.

Mr. **Brown**. Thank you.

Our next witness is Adm. William Mott, U.S. Navy, retired, chairman of the National Strategic Materials and Minerals Program Advisory Committee.

We are very happy to have you here.

Admiral **Mott**. Thank you, Mr. Brown. I am happy to be here. We had trouble with traffic driving up from Charlottesville this morning, but——

Mr. **Brown**. Well, you were too far away when you started. You should have been closer. [Laughter.]

STATEMENT OF ADM. WILLIAM MOTT, U.S. NAVY, RETIRED, CHAIRMAN, NATIONAL STRATEGIC MATERIALS AND MINERALS PROGRAM ADVISORY COMMITTEE

Admiral **Mott**. As you said, Mr. Chairman, I have the honor to be chairman of the National Strategic Materials and Minerals Program Advisory Committee, a title so long that it is usually known as the Mott Committee, because nobody can remember such a long name. We as a committee are charged to make recommendations to the Secretary of the Interior with respect to all aspects of his responsibilities for strategic and critical minerals and materials.

The highly dedicated members of my committee—and I have one behind me, T S Ary from Kerr-McGee who is going to represent the American Mining Congress—span the whole spectrum, Mr. Chairman, of expertise in the minerals and materials area. They include a former member of this distinguished body, Congressman Jim Santini; a former member of the other body, Senator Jack Schmitt, who just happens to have a Ph.D. in geology; presidents of minerals companies; academics; and major users of minerals like TRW.

I am a former member of the intelligence community, and I do my best to keep up with sources of mineral supply. I also served on the Strategic Minerals Task Force for Governor Reagan in 1980.

When we were confronted with the problem of whether we should endorse this legislation and recommend to the Secretary of the Interior that he use his influence with the administration to get it implemented, I appointed a task force headed by Congressman Santini and a number of our people on the committee who had had experience in this area. They brought a recommendation to the executive committee and then to the full committee and recommended to the Secretary of the Interior, Mr. Hodel, that he urge the administration promptly to establish the National Critical Materials Council.

A copy of that recommendation is attached to my statement, Mr. Chairman, as enclosure No. 1. I might just read a little bit from that, because it tells the story, the background, of how we approached this problem.

We said that during the last two decades, a major shortcoming common to all National Government decisions affecting materials and minerals has been the virtual absence of Cabinet-level assessment of the nationwide impact of such decisions. There has been a longstanding need to coordinate Federal programs and policies that relate to materials and minerals, including but not limited to, data, trade, research, technology, materials preparedness, and stockpiles.

In spite of this need, the serious and substantial decline in U.S. domestic nonfuel minerals industries is continuing unabated. At the same time, there has been an increasing demand to strengthen the U.S. military posture and readiness for possible major nonnuclear conflicts and the corresponding requirements for industrial emergency preparedness.

Effective management and direction of materials and minerals issues have been adversely affected by the long history of Government reorganization from the early days of the National Security Resources Board, which had a seat on the National Security Council during the late 1940's and 1950's, through the Offices of Federal Preparedness and Emergency Preparedness in the sixties and seventies, to the recent history of a subdivision of the Federal Emergency Management Agency during the past 6 years.

So, when we came down to the bottom line, we said the National Critical Materials Act, signed by President Reagan, is the first Federal statute actually to mandate establishment of such a high-level body in the Executive Office of the President. The committee strongly urges that this legislation be fully implemented.

Finally, we went to some 32 national associations, institutes, societies, and organizations, and they joined us. That ranges from the National Association of Manufacturers down to the—well, a whole group. You can read it. I attached all of them who endorsed it.

So, we made the recommendations to the Secretary and I forwarded these recommendations to the Secretary with an accompanying memorandum. That memorandum is set forth in enclosure No. 2 to my statement. It is my understanding, sir, that Secretary Hodel has either forwarded our recommendation or made an independent recommendation to the White House with his endorsement for forming this Council.

It is worthy of note, Mr. Chairman, that whenever outside bodies from industry look at the issue before this committee, they recommend implementation of Public Law 98-373. We solicited the endorsement of a great many of those outside bodies.

I am particularly gratified, sir, that the legislation under consideration authorized the Council, when established, to established such special advisory panels as it considers necessary, with each panel consisting of representatives of industry, academia, and other members of the private sector. That is exactly the character of our 25-member committee and was precisely the composition of the 1980 Critical Materials Task Force which included people like Murray Weidenbaum, the Vice President's brother, Prescott Bush, and a whole long list of people in minerals and in academia. Both of them recommended an advisory body to the President in the White House.

Not only did we recommend an advisory body in the White House, but we recommended that an outside organization named

PRAB, the President's Resource Advisory Board, be set up to help the Council. We said that the National Security Resources Board should be reinstituted, but basically, the purpose of it was the same as the purpose of this law.

This happens every time when you get an outside, across the board group to take a look at this problem. In my opinion administration policy should not issue, as, for instance, the proposed revision of the stockpile goals, absent consultation with experienced outside advice. Industry affected should have a voice in the preparation of such policies before they are set in Presidential concrete. Any President, regardless of party, would be better served by such a procedure.

That concludes my statement, sir.

[The prepared statement of Admiral Mott follows:]

Mr. Chairman and members of the Subcommittee on Transportation Aviation and Materials of the House Committee of Science and Technology:

My name is William C. Mott R. Adm. USN (ret.). I have the honor to be Chairman of the National Strategic Materials and Minerals Program Advisory Committee - sometimes known as the Mott Committee because no one can remember such a long name! We are charged to make recommendations to the Secretary of Interior with respect to all aspects of his responsibilities for stratetic and critical minerals and materials.

The highly dedicated members of my committee span the whole spectrum of expertise in the minerals and materials area. They include a former member of this distinguished body, Jim Santini, a former member of the other body, ex-senator Jack Schmitt, who happens to have a PhD in Geology, presidents of minerals companies, academics and major users of minerals. I am a former member of the intelligence community and do my best to keep up with sources of mineral supply. I also served on the Strategic Minerals Task Force for Governor Reagan in 1980.

On April 29, 1985 our committee recommended to the Secretary of the Interior "that he urge the Administration promptly to establish the National Critical Materials Council" A copy of that recommendation is attached hereto as enclosure (1).

In a memorandum dated May 8, 1985, I forwarded that recommendation to Secretary Hodel and my forwarding memorandum is set forth in enclosure (2). It is my understanding that the Secretary forwarded our recommendation to the White House with his endorsement. It is worthy of note Mr. Chairman, that whenever outside bodies from industry look at the issue before this Committee, they recommend implementation of PL 98-373. We solicited the endorsement of some 32 national associations, institutes, societies and organizations, a list of which is attached to enclosure (1).

I am particularly gratified that the legislation under consideration authorized the Council to "establish such special advisory panels as it considers necessary, with each panel consisting of representatives of industry, academia and other members of the private sector . . . " That is exactly the character of our 25 member Committee and was precisely the composition of the 1980 critical minerals task force, both of which recommended an advisory body to the President in the White House. In my opinion, administration policy should not issue, as has the proposed revision of stock pile goals, absent consultation with experienced outside advice. Industry affected, should have a voice in the preparation of such policies before they are set in presidential concrete. Any President would be better served by such a procedure.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

MAY 8 1985

Memorandum

To: Secretary

(Sgd) Robert N. Broadbent

Through: Assistant Secretary - Water and Science MAY [illegible] 198[illegible]

From: Chairman, National Strategic Materials and Minerals Program Advisory Committee (NSMMPAC)

(SGD) ADM WILLIAM C. MOTT

Subject Summary: NSMMPAC Recommendations

Your Committee had a very useful and productive meeting in the West. Great regret was expressed that you could not be with us, but Rob Broadbent attended all our sessions and recommended the format we should use in forwarding our recommendations to you. We shall follow it.

Our first recommendation relates to the National Critical Materials Council, authorized by law (Title II of PL 98-373 of July 31, 1984) but not yet implemented by the President. It reads as follows:

> The National Strategic Materials and Minerals Program Advisory Committee recommends to the Secretary that he urge the Administration promptly to establish the National Critical Materials Council, as called for by Title II of PL 98-373, enacted July 31, 1984.

Every "outside" group which has considered what kind of oversight mechanism should be created within the executive branch to coordinate strategic minerals priorities has recommended some kind of body be established in the Executive Office of the President. Thus, the 1980 Strategic Minerals Task Force recommended to Governor Reagan the reestablishment of the National Security Resources Board. Now, our Committee endorses the creation of the National Critical Minerals Council for much the same reasons as set forth in the 1980 Task Force Report. Minerals need an effective voice in the White House which they do not now have. The background for our Committee's recommendation is attached hereto and states the case for need quite well.

Recommendations without implementation are like monkey coprolites floating in Challenger. There needs to be an effective implementation policy, which only you can approve. If you endorse the above recommendation, our Committee, on your signal, stands ready to form a task force to follow through. We could, for instance, generate letters to the President from some 30 or 40 national associations such as the NAM and the U.S. Chamber. Those of us who have friends close enough to have the President's ear could persuade those friends to bend that ear on behalf of the Council. We are conscious of the fact, Mr. Secretary, that our Committee is advisory to you alone. However, all our recommendations are made in a public forum (by law) so the whole world knows what they are.

National Critical Materials Council

RECOMMENDATION

The National Strategic Materials and Minerals Program Advisory Committee recommends to the Secretary that he urge the Administration promptly to establish the National Critical Materials Council, as called for by Title II of PL 98-373, enacted July 31, 1984.

Adopted 4-29-85

National Critical Materials Council

BACKGROUND

During the last two decades, a major shortcoming common to all National government decisions affecting materials and minerals has been the virtual absence of cabinet-level assessment of the nationwide impact of such decisions. There has been a long-standing need to coordinate Federal programs and policies that relate to materials and minerals, including (but not limited to) data, trade, research, technology, materials preparedness, and stockpiles. In spite of this need:

- o The serious and substantial decline in U.S. domestic non-fuel minerals industries is continuing unabated;
- o At the same time, there has been an increasing demand to strengthen the United States' military posture and readiness for possible major non-nuclear conflict(s) and the corresponding requirements for industrial emergency preparedness;
- o Effective management and direction of materials and minerals issues have been adversely affected by the long history of Government reorganization, from the early days of the National Security Resource Board, which had a seat on the National Security Council during the late 40's and 50's, through the Offices of Federal Preparedness and Emergency Preparedness in the 60's and 70's, to the recent history of a subdivision of the Federal Emergency Management Agency (FEMA) during the past six years.

Materials and minerals constitute one of the three basic "building blocks" of our National economy (the other two being energy and labor). This minerals "building block" consists of a complex set of components, each of which is affected by its own equally complex set of external factors. Perturbations in separate elements of the materials and minerals sector may appear to have little significance from a macroeconomic perspective, but may have major "multiplier" effects upon the U.S. economy. These circumstances suggest that the President's 1982 National Materials and Minerals Program Plan cannot be managed effectively and also be responsive to urgent National needs without competent, well-focused, and continuous review and guidance from a level in the Executive Branch able to oversee all key elements of the program.

During the past year the Cabinet Council on Natural Resources and Environment has resumed active interest in critical materials and minerals issues, and has recently established an interagency working group to consider them. In the Committee's opinion, this positive step, although encouraging, is less likely to be able to provide the needed continuity and cohesiveness of program oversight than is the organization called for by PL 98-373. In part this derives from the extent of other major responsibilities of the Cabinet Council (which has no statutory permanence).

There is a lawful mandate to appraise the materials activities of the Federal government in the National Materials and Minerals Policy Research and Development Act of 1980 (30 USC 1601). In addition, the need for high-level input to the President on materials-related issues was stressed by the 1980 Strategic Minerals Task Force of then-President-elect Reagan.

The National Critical Materials Act, signed by President Reagan on July 31, 1984 (as Title II of the Arctic Research Policy Act), is the first Federal statute actually to mandate establishment of such a high-level body in the Executive Office of the President. The Committee strongly urges that this legislation be fully implemented. Title I of PL 98-373 (to establish the Arctic Research Commission) has already been implemented by the President's Executive Order in January 1985.

Finally, some 32 national associations, institutes, societies, and organizations (see attached list) have joined in supporting the prompt implementation of Title II of PL 98-373, creating the National Critical Materials Council.

The following organizations advocate prompt action by the Administration to implement Title II of P.L. 98-373, to create the National Critical Materials Council:

Aerospace Industries Association
American Iron & Steel Institute
American Mining Congress
Association of American State Geologists
California Mining Association
Chamber of Commerce of the United States
Consulting Geologists Association
Electronic Industries Association
Federated Materials Societies *
FerroAlloys Association
International Economic Policy Association
Machinery & Allied Products Institute
Motor Vehicles Manufacturers Association
National Association of Manufacturers
National Electronic Manufacturers Association
Cadmium Council, Inc.
Lead Industries Association, Inc.
Zinc Institute, Inc.
The Gold Institute
The Silver Institute
The Silver Users Association

* Members

American Association for Crystal Growth
The American Ceramic Society, Inc.
American Chemical Society
American Institute of Chemical Engineers
American Society of Mechanical Engineers
American Society for Metals
American Society for Testing and Materials
The Electrochemical Society, Inc.
Institute of Electrical & Electronic Engineers, Inc.
National Association of Corrosion Engineers
Observer Society: Electric Power Research Institute

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Mr. **Brown**. Thank you very much, Admiral Mott.

Mr. Lewis, do you have any questions?

Mr. **Lewis**. Thank you, Mr. Chairman. Admiral Mott, your advisory committee was instituted to help the Secretary of the Interior and other Cabinet-level officials to deal with the problems of critical materials and minerals.

Admiral **Mott**. Sir, only the Secretary of the Interior. When we make a recommendation to the Secretary of the Interior, what he does with it is up to him. We have recommended certain things such as a Canadian and American exchange of notes with respect to minerals which would be taken to the Secretary of State by the Secretary of the Interior.

Mr. **Lewis**. OK. In your opinion, has the committee been successful in addressing our Nation's mineral and materials needs?

Admiral **Mott**. Well, perhaps it doesn't become me to say. We have worked for two Secretaries of the Interior Judge Clark who came down there from the National Security Council and who established the committee—and let me say that my personal reception by both Secretaries has been very warm. Judge Clark would always listen to me and say, Bill, this is what I want you to do, and I would try to do it, and my committee would try to address it.

Secretary Hodel has been receptive to our recommendations as well. We have made some 14 recommendations to the Secretary of the Interior, of which this is one.

Mr. **Lewis**. Could you share with us what some of these recommendations are that the committee made?

Admiral **Mott**. First of all, let me say that one of our first recommendations was that there is a great lack of education about the criticality of minerals in this country. One of the things, Mr. Lewis, that started off this committee was contact I had with a man named Freymoyer who is the purchasing agent for Carpenter Technology, a specialty steel company up in Pennsylvania.

This company was very successful. Specialty steel companies are not in the same category as regular steel companies. They were about to have a $400 million expansion in Reading, PA, which meant a lot of jobs for Reading.

The board called him in, his board of directors, and said look, we are not going to raise a dime of this $400 million until you get down to southern Africa and find out whether you can get long-range supplies of the minerals that we need to make specialty steel, chromium and cobalt and so on. So, we left from the University of Pennsylvania platform to go to southern Africa to do just that.

So, these minerals are terribly important to basic industries, and we have made a recommendation to the Secretary that something has to be done about reviving basic industry.

To go very briefly through the list, we have said there ought to be a better public lands inventory than exists right now, and we are working on that.

We need minerals education.

We recommended that there should be a national defense stockpile corporation to manage the stockpile which would take it out—everybody who has looked at this problem, Mr. Lewis, including the 1980 minerals task force, said we should depoliticize the stockpile. We thought the way to do it was to set up a national defense stockpile corporation.

Then, we need to revive the joint United States-Canadian mobilization planning with respect to minerals.

We feel that there ought to be a minerals section in the budget which we are in the process of preparing.

We thought that access to foreign sources of strategic and critical minerals was terribly important, and I put emphasis on the word access with respect to southern Africa, and I say southern Africa and not South Africa by itself, that the foreign policy of the United States ought to be conducted in such a way as to guarantee access to minerals, that sanctions have never worked and will not work in that area.

We were concerned about the taxation of natural resources, and we urged that the President weigh carefully the implications for the future supply of strategic and critical materials of implementing the Treasury Department's tax reform proposals.

We thought that all of these bodies like the International Monetary Fund and the World Bank should not make loans, or the U.S. representative on those lending bodies, should not approve loans willy-nilly until he had been briefed on the effect that such loans might have on domestic industry.

We noted that there was a defense industrial base erosion, that the Government should develop an interagency mechanism for identifying critical industrial sectors threatened with becoming endangered and for recommending cost effective countermeasures.

The defense stockpile goal setting—we felt that they should be established or changed only through a process that includes specific considerations of every one of the critical minerals.

We developed something called a strategic material policy decision tree which I think Mr. Maxwell has to show just where things can go awry.

At our last meeting in San Francisco, we adopted a recommendation which, unfortunately, I don't have here in the Public Lands Subcommittee. Again, it goes back to the fact that we think that there are some weaknesses in the public lands identifications.

Mr. Lewis. Are you aware of any actions that have been taken to implement your recommendations?

Admiral Mott. Yes, I am, sir. I met with the board of directors of the Minerals Information Institute in Denver last week, and our committee—they are concerned with education for the most part. Our committee has some people on it who have foundations. One of them gave $100,000 to that Minerals Information Institute to help with the process of education about the importance of minerals in high schools and elementary schools in this country.

There is an ongoing program in the State of Colorado and the State of Arizona and in the State of California, Mr. Brown, started by the Minerals Information Institute headquartered in Denver.

There has already been a meeting in the State Department between low level Canadian officials and American officials to have another exchange of notes which would make the minerals of Canada which are critical available to us in times of emergency. We also recommended that the same thing ought to be explored with Mexico. This might be a very good time to explore it with

Mexico, and I don't know exactly what the State Department is doing about that.

All of our recommendations used to go to the Cabinet Council on Resources, but that was abolished. We feel now that through the good offices of Mr. Broadbent and the Secretary of the Interior, we need to set up a line of communication to make sure that our recommendations are considered when forwarded by the Secretary of the Interior. That would probably go through my friend, Ed Meese, who is domestic counsel.

Mr. LEWIS. Let me ask one final question. What do you see as the future of your committee, and let me elaborate on that. Will it be a permanent committee with a strong role in the Council, or will it be dissolved once the Council is formed?

Admiral MOTT. Mr. Lewis, that question really should be addressed to the Secretary of the Interior. Our 2-year term, which can be renewed at the Secretary's pleasure, runs out, I think, around May 1.

I have repeatedly offered to the Secretary the services of our committee to be an advisory body to the Minerals Council should the Minerals Council want to have a broadly based advisory committee such as ours. We are here to do a job for the Secretary of the Interior, and if the Secretary of the Interior wants us to farm out, I can form task forces from this broad-based committee to explore whatever the Minerals Council would like to have explored by our committee.

So, it is up to the Secretary of the Interior whether or not our tenure is extended beyond May 1.

Mr. LEWIS. Thank you, Admiral, and thank you for the testimony.

Thank you, Mr. Chairman.

Mr. BROWN. Admiral Mott, could I ask you to amplify on just one point in your statement where you say, in your opinion, administration policy should not issue, as has the proposed revision of stockpile goals, absent consultation with experienced outside advice. May I presume that you feel that the proposed stockpile goals are not well founded and were not based on consultation with experienced outside advice?

Admiral MOTT. Mr. Brown, when this issue came before Secretary Clark, I asked him if he wanted our committee to get involved in the stockpile goal planning. He said, "Yes, I do, Bill." I said, "Well, then, you will have to call Bud McFarland and get a task force which I will appoint cleared to look at the whole ball of wax."

That was done, and I appointed three of my very top people, Simon Strauss—I am known as the ancient mariner, but he is even a couple of months older than I am—but he has been in this since the very beginning of stockpiles. He was vice chairman of the board of ASARCO, the big mining combine. And I felt a user should be involved. TRW is one of the big users of critical minerals because they get into making the blades for jet engines and so on. And Dr. Tim Stanley who is our economist-lawyer member of the committee and the head of a think-tank that deals with minerals.

All I can say, sir, since I personally chose not to look at all of the secret assumptions that went with this, but our committee came back and blasted the proposed stockpile. Therefore, I passed a recommendation to the Secretary giving the committee's conclusions after they had gone through the procedure we always go through. We take it to the executive committee which is made up of the chairmen of the four subcommittees. Then it goes to the full committee.

Now, I understand, Mr. Brown, that some of the assumptions have been changed as a result of that.

However, to answer your question more directly, I have been told or I have it on information and believe, maybe I had better say, that not one single outside person from industry was consulted during the whole preparation of the stockpile plan. When I went to the White House to get a briefing on this early on, I suggested that they should be and, apparently, they were not.

Again, I come back to the fact that this very distinguished group in 1980 of which I was a member came up with virtually the same recommendation. We said, hey, you have to get outside advice from industry affected when you are fooling with something like this. We had two or three people on there, one of whom had come in from our Middle East task force and was familiar with operations in that area. I don't think you could put a ruler between what we recommended in 1980 and what the committee has come up with and passed into law through the Congress.

Does that answer your question?

Mr. Brown. I think so, Admiral Mott. I very much appreciate what you have said, and I want all of the material that you have submitted to be included in the record as part of your testimony. We are very grateful to you for appearing here this morning.

Admiral Mott. I will see to is that Paul (Maxwell)—I think Paul already has all of our recommendations, do you not, Paul?

Mr. Brown. He better have. [Laughter.]

[The material referred to follows:]

National Strategic Materials and Minerals Program Advisory Committee (NSMMPAC--the "Mott Committee.")

SUMMARY OF RECOMMENDATIONS

(1) PUBLIC LANDS INVENTORY: That the U.S. establish a single land use data base to determine the extent of public lands "withdrawn from multiple use . . . to be completed no later than the end of fiscal year 1985."

(2) MINERALS EDUCATION: That the Secretary lend his support to greater public education on the "critical importance of minerals and materials in our daily lives."

(3) NATIONAL DEFENSE STOCKPILE CORPORATION: That the Defense stockpile program be administered by a Government corporation having no other responsibilities.

(4) JOINT U.S-CANADIAN MOBILIZATION PLANNING: That the Joint [U.S. - Canadian] Industrial Mobilization Committee be reactivated; and that the feasibility of similar joint planning with Mexico be explored.

(5) MINERALS SECTION IN THE "BUDGET-IN-BRIEF": That the President include in his Budget in Brief a section describing the Government's strategic materials programs and activities.

(6) ACCESS TO FOREIGN SOURCES OF STRATEGIC AND CRITICAL MINERALS: That U.S. foreign policy "be pursued in such a way as to assure free market access to strategic and critical materials . . . especially when they are not available from domestic sources."

(7) TAXATION OF NATURAL RESOURCES: That the President "weigh carefully the implications for the future supply of strategic and critical materials" of implementing the Treasury Department's November, 1984, tax reform proposal.

(8) LOANS THAT CONTRIBUTE TO MINERALS SUPPLY-DEMAND IMBALANCE: That the President instruct his representatives to any multinational lending agency to vote against any loan that would create or contribute to supply-demand imbalance for any internationally traded strategic commodity.

(9) DEFENSE INDUSTRIAL BASE EROSION: That the Government develop an interagency mechanism for identifying critical industrial sectors threatened with becoming "endangered," and for recommending cost-effective countermeasures.

(10) DEFENSE STOCKPILE GOAL SETTING: That National Defense Stockpile commodity goals be established or changed only through a process that includes specific considerations detailed in the recommendation.

(11) STRATEGIC MATERIAL POLICY DECISION TREE: That the Government adopt a minerals policy analysis scheme ("decision" or "logic tree") developed by the Committee.

(12) SURVIVAL OF BASIC INDUSTRIES: That the Secretary advocate vigorous use of existing mechanisms and remedial actions to prevent further deterioration of basic industries critical to the defense of the Nation.

(13) NATIONAL CRITICAL MATERIALS COUNCIL: That the Administration promptly establish the National Critical Materials Council.

(14) DOMESTIC STRATEGIC MINERAL POTENTIAL: That the Bureau of Mines: 1) identify and catalogue known domestic strategic mineral deposits, and 2) provide a cost analysis of potential development of selected deposits using DPA Title III incentives.

Admiral Mott. Thank you very much, Mr. Chairman.

Mr. Brown. Thank you, Admiral Mott.

I would like to call the next witnesses as a group to come to the table: Dr. James Ford, president of the Federation of Materials Societies; Mr. T S Ary, president of Minerals Exploration Division of Kerr-McGee and chairman of the Minerals Availability Committee of the American Mining Congress; and Mr. Emil Romagnoli.

If you gentlemen will indulge us, we will ask you to present your statements in the order that I have called your names, and then we will question you when you have all three finished presenting your testimony. You may start, Dr. Ford.

STATEMENT OF JAMES A. FORD, PRESIDENT, FEDERATION OF MATERIALS SOCIETIES, WASHINGTON, DC

Dr. Ford. Mr. Chairman and members of the subcommittee, I am James A. Ford, president of the Federation of Materials Societies [FMS]. The Federation is a consortium of 12 technical organizations composed of scientists and engineers with expertise in the materials and related areas such as processing, manufacturing, materials recovery, and resource availability.

Our member societies are the American Society for Crystal Growth, the American Ceramic Society, the American Chemical Society, American Institute of Chemical Engineers, the American Society of Mechanical Engineers, American Society for Metals, ASTM, the Electrochemical Society, the Institute of Electrical and Electronic Engineers, International Precious Metals Institute, the International Society for Hybrid Microelectronics, and the National Association of Corrosion Engineers.

FMS since its inception has held biennial conferences for the purpose of addressing materials policy issues. The eighth such biennial was held in 1984. All of these biennial conferences have consistently pointed to the need for a coherent national materials policy. Findings and recommendations of these conferences are reflected in the 1972 report of the President's Commission on National Materials Policy, the National Materials and Minerals Policy Research and Development Act of 1980, and the National Critical Materials Act of 1984, and have been considered in many deliberations of Congress such as your subcommittee here.

The materials community for too long has lamented the lack of a comprehensive, coherent, defined national materials policy. The act under consideration here today provides the focus for these concerns.

A particular concern is the lack of comprehensive planning and coordination among Federal research and development programs in materials science and engineering and the consequent inability of the Nation, Government with industry and academia, to put together a comprehensive materials R&D package with consequent obvious implications related to international competitiveness.

For the past 3 years, FMS has prepared a summary of R&D in materials science and engineering as a part of the analysis of the R&D budgets coordinated by the American Association for the Advancement of Science. Our research into this and other areas has revealed a lack of clear definition of policy goals across agencies and a consequent opportunity for both duplication and omission of effort in specific materials areas. Both these problems can be linked to the absence of an effective focusing mechanism within the Government.

Clearly, there is a need for such a focus on materials issues. The National Critical Materials Council called for by Public Law 98-373 would provide this focus. The responsibilities of the Council are clearly stated in the law and outline the parameters of the national materials policy advocated by the materials community.

These parameters include coordination of materials policies across all Government agencies, coordination of such materials policies with other Government policies—a very important broad aspect of the requirement of the Council—definition of responsibilities for materials policy within the Government, establishment of priorities for R&D, critical materials issues such as the stockpile, and other areas where materials affect the economic and strategic health of the Nation.

FMS is particularly interested in the responsibility given the Council to establish a national Federal program for advanced materials research and technology, including basic phenomena through processing and manufacturing technology. Those latter words are underlined for emphasis since they are the theme of our ninth biennial conference to be held next summer, and we would welcome participation by the National Critical Materials Council and this subcommittee in that conference next summer.

At this point, let me say that FMS is working with the recently reorganized interagency Committee on Materials, COMAT. We applaud the new initiatives that Chairman John McTague is attempting to provide for that COMAT committee in the coordination of Government R&D activities and his initiatives to provide involvement of the private sector in setting those priorities.

However, we do not believe that COMAT will provide the means for developing a true national materials policy. As one example, COMAT reportedly does not intend to address national stockpile issues. This is an area of great concern to the materials community and one that we consider an integral part of any national materials policy.

At the September 26 meeting of the FMS board, the trustees voted to endorse the following recommendation originally passed by the Mott committee. It is detailed in the testimony. I won't read it, but it is one that you have discussed extensively with Admiral Mott.

> . . . That agencies charged with determining goals for the National Defense Stockpile observe a procedure that includes the following steps to ensure that the goals provide an acceptable level of preparedness:
>
> (1) Consulation with expert representatives from Government and private sector materials and minerals producers, processors, end-users, and recyclers;
>
> (2) Evaluation of needs on a commodity-by-commodity basis, with emphasis on technological and not economic considerations;
>
> (3) Consideration of industrial and essential civilian needs as well as military-defense needs;
>
> (4) Through Government-wide and private sector review of current and emerging technology to enable sound judgments to be made about which stockpiled materials are obsolete (and should, therefore, be disposed of) and which materials—including those with little or no present commercial utility—should be added to the stockpile for defense purposes;

(5) Broad review of the criteria used to determine stockpile goals to assure that they include: (a) reasonable assumptions about the level of austerity that Government should impose on its citizens to accommodate defense mobilization; (b) proper regard for historical experience during prior mobilizations; (c) allowance for the importance of maintaining civilian morale during a shift to a mobilization economy; (d) strict adherence to all existing laws applicable to the National Defense Stockpile.

In summary, we believe that many of the pieces of a national materials policy currently exist, but what is mainly missing right now is a coordinating body to put it all together at a high enough level in the Government to demand the attention the issue deserves. The National Critical Materials Council would fill this need.

Now, Mr. Chairman, I would like to address an agenda for the Council. FMS would suggest the following items drawn from the results of workshops at our eighth biennial conference on national materials policy held in September 1984.

First, development of an adequate manpower base to permit reliable predictions on the supply of and the demand for materials scientists, engineers, technicians, and trained workers to meet future materials requirements.

Second, evaluation and definition of the need for advanced facilities and equipment in universities, Government laboratories, and industry, and the development of a plan to satisfy current and future requirements for state-of-the-art facilities and equipment for processing, characterizing, and testing of materials.

Third, development of a central, critically evaluated materials property data base to foster the much needed technology transfer between the researchers and the engineers producing materials property data and those in need of the data for design of new materials, products, and processes.

Fourth, stimulation within the materials science and engineering community of more attention to advanced synthesis of materials.

Fifth, and I am sure I will lose count in a minute here—encouraging establishment of new centers to integrate materials science and engineering with the design, production, and marketing of products—the technology transfer issue.

Promoting effective and efficient management of the stockpile.

Analysis and recommendations to Government regulatory agencies on barriers to commercialization of materials technologies.

Spearheading a strong management, labor, and government commitment to improving productivity, possibly including sponsorship of a prestigious national award for productivity.

Encouraging development of a quality awareness program across U.S. industries.

Advising Congress and the administration on tax and other policies designed to encourage investment in the nation's industrial base as well as encouraging leapfrog technologies.

Providing a focus for establishment of the industry university centers called for in the Stevenson-Wydler Act.

Focusing attention on the fact that a widespread tendency toward overspecialization in engineering, research, corporate organization, and Government support for research and education has resulted in a shortage of people having both a strong technical background and strong management skills to ensure that materials and manufacturing based industry will increase competitiveness in world markets.

Last, encouraging increased involvement in education and training at universities by the mission agencies with emphasis on materials technologies important to both defense and to civilian industrial applications.

Mr. Chairman, we strongly urge the prompt and complete implementation of Public Law 98-373. We have given suggestions for an ambitious but by no means all inclusive agenda for the National Critical Materials Council.

The materials community does not expect nor want the Council as a Government body to attack this agenda on its own. We stand ready to assist in forging the kind of Government, industry, university, and public alliance that is so urgently needed if the United States is finally going to have a national materials policy which will help it to optimize our contributions to national security, industrial competitiveness, national technical leadership, and employment, and quality of life for all citizens.

Thank you.

[The prepared statement of Dr. Ford follows:]

STATEMENT OF JAMES A. FORD
PRESIDENT, FEDERATION OF MATERIALS SOCIETIES

BEFORE THE U.S. HOUSE
SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS

OCTOBER 8, 1985

Mr. Chairman and members of the Subcommittee, I am James A. Ford, President of the Federation of Materials Societies (FMS). The Federation is a consortium of twelve technical organizations composed of scientists and engineers with expertise in the materials and related areas such as processing, manufacturing, recovery and resource availability. Our member societies are the American Association for Crystal Growth, The American Ceramic Society, American Chemical Society, American Institute of Chemical Engineers, American Society of Mechanical Engineers, American Society for Metals, ASTM, The Electrochemical Society, Institute of Electrical and Electronic Engineers, International Precious Metals Institute, International Society for Hybrid Microelectronics, and National Association of Corrosion Engineers. Statements issued by FMS do not purport to speak for the individual member societies.

FMS has, since its inception, held biennial conferences for the purpose of addressing materials policy issues. The 8th Biennial was held in 1984. These biennial conferences have consistently pointed to the need for a coherent national materials policy. Findings and recommendations of these conferences are reflected in the 1972 report of the President's Commission on National Materials Policy, the National Materials and Minerals Policy, Research and Development Act of 1980, the National Critical Materials Act of 1984, and in many deliberations of Congress.

The materials community for too long has lamented the lack of a comprehensive, coherent, defined national materials policy. The Act under consideration here today provides the focus for these concerns. A particular concern is the lack of comprehensive planning and coordination among federal research and development programs in materials science and engineering, and the consequent inability of the nation — government with industry and academia — to put together a comprehensive materials R&D package, with obvious implications related to international competitiveness. For the past three years, FMS has prepared a summary of "R&D in Materials Science and Engineering" as part of the analysis of R&D budgets coordinated by the American Association for the Advancement of Science. Our research into this and other areas has revealed a lack of clear definition of policy goals across agencies, and a consequent opportunity for both duplication and omission of effort in specific materials areas. Both these problems can be linked to the absence of an effective focusing mechanism within the government.

Clearly, there is a need for such a focus on materials issues. The National Critical Materials Council called for by PL 98-373 would provide this focus. The responsibilities of the Council are clearly stated in the law, and outline the parameters of the national materials policy advocated by the materials community. These parameters include coordination of materials policies across all government agencies; coordination of such materials policies with other government policies; definition of responsibilities for materials policy within the government; establishment of priorities for R&D; critical materials issues such as the stockpile; and other areas where materials affect the economic and strategic health of the nation. FMS is particularly interested in the responsibility given the Council to establish a national Federal program for advanced materials research and technology, including basic phenomena through **processing and manufacturing technology.** This is the theme of our 9th Biennial Conference, to be held August 4-7, 1986, and we welcome participation by both the Council and this Subcommittee in that conference.

At this point let me say that FMS is working with the recently reorganized interagency Committee on Materials (COMAT). We applaud the new initiatives of COMAT Chairman John McTague in attempting to provide coordination of government R&D activities, and to provide involvement of the private sector in setting priorities for such activities. However, we do not believe that COMAT will provide the means for developing a true national materials policy. As just one example, COMAT reportedly does not intend to address national stockpile issues. This is an area of great concern to the materials community, and one that we consider an integral part of any national materials policy. At the September 26 meeting of the FMS Board, the Trustees voted to endorse the following recommendation originally passed by the National Strategic Materials and Minerals Program Advisory Committee:

> "...that agencies charged with determining goals for the National Defense Stockpile observe a procedure that includes the following steps to ensure that the goals provide an acceptable level of preparedness:

(1) consultation with expert representatives from Government and private sector materials and minerals producers, processors, end-users, and recyclers;

(2) evaluation of needs on a commodity-by-commodity basis, with emphasis on technological and not economic considerations;

(3) consideration of industrial and essential civilian needs as well as military-defense needs;

(4) through Government-wide and private sector review of current and emerging technology to enable sound judgments to be made about which stockpiled materials are obsolete (and should, therefore, be disposed of) and which materials — including those with little or no present commercial utility — should be added to the stockpile for defense purposes;

(5) broad review of the criteria used to determine stockpile goals to assure that they include: (a) reasonable assumptions about the level of austerity that Government should impose on its citizens to accommodate defense mobilization; (b) proper regard for historical experience during prior mobilizations; (c) allowance for the importance of maintaining civilian morale during a shift to a mobilization economy; (d) strict adherence to all existing laws applicable to the National Defense Stockpile."

In summary, we believe that many of the pieces of a national materials policy currently exist, but what is mainly missing right now is a coordinating body to put it all together at a high enough level in the government to demand the attention the issue deserves. The National Critical Materials Council would fill this need.

Now I would like to address an agenda for the Council. FMS would suggest the following, drawn from the results of the workshops at our 8th Biennial Conference on National Materials Policy held in September 1984:

- Development of an adequate manpower data base to permit reliable predictions on the supply of and demand for materials scientists, engineers, technicians and trained workers to meet future materials requirements.
- Evaluation and definition of the need for advanced facilities and equipment in universities, government laboratories and industry, and development of a plan to satisfy current and future requirements for state-of-the-art facilities and equipment for processing, characterizing and testing of materials.

- Development of a central, critically evaluated materials property data base to foster the much needed technology transfer between the researchers and engineers producing materials property data and those in need of the data for the design of new materials, products and processes.
- Stimulation within the materials science and engineering community of more attention to advanced synthesis of materials.
- Encouraging establishment of new centers to integrate materials science and engineering with the design, production and marketing of products.
- Promoting effective and efficient management of the stockpile.
- Analysis and recommendations to government regulatory agencies on barriers to commercialization of materials technologies.
- Spearheading a strong management/labor/government commitment to improving productivity, possibly including sponsorship of a prestigious national award for productivity.
- Encouraging development of a quality awareness program across U.S. industries.
- Advising Congress and the Administration on tax and other policies designed to encourage investment in the nation's industrial base as well as encouraging "leap-frog" technologies.
- Providing a focus for establishment of the industry-university centers called for in the Stevenson-Wydler Act.
- Focusing attention on the fact that a widespread tendency toward overspecialization in education, research, corporate organization, and government support for research and education has resulted in a shortage of people having both a strong technical background and strong management skills to ensure that materials and manufacturing based industry will increase competitiveness in world markets.
- Encouraging increased involvement in education and training at universities by the mission agencies, with emphasis on materials technologies important both to defense and to civilian industrial applications.

Mr. Chairman, we strongly urge the prompt and complete implementation of PL 98-373. We have given suggestions for an ambitious but by no means all-inclusive agenda for the National Critical Materials Council. The materials community does not expect — nor want — the Council as a government body to tackle this agenda on its own. We stand ready to assist in forging the kind of government/industry/university/public alliance that is so urgently needed if the United States is finally going to have a national materials policy to optimize our contributions to national security, industrial competitiveness, national technical leadership and employment, and quality of life for all citizens.

Mr. BROWN. Thank you, Dr. Ford, for your excellent statement.

Mr. Ary, would you proceed with your statement next? And are you speaking with which hat here, Minerals Exploration Division or head of the Minerals Availability Committee?

Mr. ARY. I am speaking on behalf of the American Mining Congress.

Mr. BROWN. All right. The other is for identification purposes only, then.

STATEMENT OF T S ARY, PRESIDENT, MINERALS EXPLORATION DIVISION, KERR-McGEE CORP.; AND CHAIRMAN, MINERALS AVAILABILITY COMMITTEE, AMERICAN MINING CONGRESS

Mr. ARY. My name is T S Ary. I am president of the Minerals Exploration Division of Kerr-McGee Corp. I serve as the chairman of the Minerals Availability Committee of the American Mining Congress, and I am testifying today on its behalf.

The American Mining Congress is an industry association that encompasses producers of most of America's metals, coal, and industrial and agricultural minerals; manufacturers of mining and mineral processing machinery and equipment and supplies; and engineering and consulting firms and financial institutions that serve the mining industry.

Before I get into the written part of this, I would like to say that I was quite surprised and appalled this morning to listen to Dr. McTague talk about the OSTP and their efforts to be all things to all people in this area. I was surprised, first, because they are attempting, it seems to me, to circumvent the act of Congress. Now, if any of us tried anything like that, we would either be held in contempt or be faced with some sort of a violation of the law. I just cannot imagine OSTP trying to make an end run around an act of Congress.

On a lighter note, as a professional geologist, I am really upset because he didn't even know how important a role a geologist played in the Manhattan project. Without the geologist, there would have been no project because there would have been no uranium ore with which to play.

So, I am not quite sure how I feel about Dr. McTague after this morning, but I do agree with Dr. Ford. I do not believe that McTague and COMAT will provide the means of developing a materials policy for our Nation. I just don't think that they are broad enough in their scope. They are really good in the things that they do, but anybody who would leave out a stockpile question has no business developing a mineral policy for the United States.

Before discussing the implementation of the National Critical Materials Act of 1984 and the other legislation that should have provided the basis for a sound U.S. minerals policy, and so that this subcommittee can more clearly understand the reasons for our comments, it is necessary to review briefly the economic conditions of the mining industry and its effect upon the national security and economic well being of the Nation.

The economic state of the mining industry has become front page news. The cover story of the December 17, 1984 issue of "Business Week" aptly stated that the recovery of 1983-84 largely bypassed producers of copper, iron ore, nickel, lead, zinc, and molybdenum. Senator Domenici, in his excellent statement which appeared in the January 22, 1985 Congressional Record, points out that the United States is in danger of losing 75 percent of its copper industry, 40 to 50 percent of its iron ore industry, and that 90 percent of the U.S. potash industry which is located in his State is also in peril. Since that time, except for industrial minerals, coal, and precious metals, the situation has further deteriorated.

Certainly, those trends are of vital concern to the mining and mineral processing industries in the United States. But more importantly, they impact dangerously upon the national security and economic well being individually of each citizen and corporately upon the Nation.

From a national security standpoint, unless positive actions are taken by government, the country faces a devastating minerals crisis. The United States has become increasingly dependent on foreign sources for many strategic minerals, base metals, and industrial materials that are essential to the Nation's security and industrial base. Some of the foreign sources are from countries subject to economic and social and political instability. Many are located at the far end of the vulnerable shipping lanes. These factors make the Nation liable to cutoffs of supplies and to gyrations of price.

A few facts and figures illustrate the effect of reduced mineral production upon our Nation's well-being. In 1981, the U.S. metals mining was an $8.9 billion enterprise. By 1983, it had shrunk to just $5.9 billion. The jobs provided exceeded 109,000 people in 1981, and at the beginning of 1985, what remained was a workforce of about 45,000, and the prognosis is for further reduction.

The committee will recognize the parallel between the difficulties facing the mining industry and the current plight of the Nation's farmers, a subject intensely discussed in the Halls of Congress in recent weeks. The farmers and the miners of this country are the source of the basic materials for all economic activity.

There has been no lack of mineral and material policy studies. Several have been issued from within the Federal Government and from other sources. All of these studies start with acknowledgement of the national significance of an adequate mineral supply and the importance of a strong domestic industry. Although most of the studies agree that a degree of foreign imports provides least-cost benefits to the consumer, at the same time, however, they point out the pitfalls of import dependency and how such dependency forfeits freedom to make political, economic and defense decisions.

After a dozen years of effort of Senator Allott of Colorado and his colleagues, the Congress enacted the Mining and Minerals Policy Act of 1970, clearly a policy declaration that provided a means of not only addressing the changes in reliability of foreign supplies but, more importantly, establishing a national value of domestic production. This clear and concise statement established a set of congressional priorities against which the executive branch is to weigh other objectives and proposed actions.

The Congress declared that mining and mineral activities lie solely within the private sector, but the Federal Government is responsible for fostering and encouraging those activities. The Congress clearly intended that the individual and collective impacts on the mining sector of other national priorities be evaluated completely and carefully in full recognition both of the importance of mining and the consequences of contemplated Federal actions.

Here I am deviating a little from what is written. Congress was clearly concerned with the interaction between materials and the environment, and the National Commission on Materials Policy was created by the National Materials Policy Act of 1970. The Commission was charged with making a full and complete investigation and study for the purpose of developing a national minerals policy. After 2 years of work, the Commission submitted its final report entitled "Materials Needs and the Environment."

Three summary directives for policymakers evolved from the Commission's studies. One had to do with the striking of a balance between the two competing but worthy causes: the need to produce and develop the Nation's resources and the requirement to maintain a safe and quality environment. Another finding of the Commission was that the materials policy should be managed more effectively by recognizing the complex interrelationships so that laws, executive orders, and administrative practice reinforce policy and not counteract it.

The Commission concluded that changes would be necessary in the organization of the Federal Government for the formulation and execution of a materials policy. The extensive decentralization of policy planning and decisionmaking, both in the executive branch and in the Congress, for materials, energy, and environmental problems had given rise to an ad hoc crisis approach that to date had characterized policy development and execution in the materials field.

Here we are, 12 years later, still questioning why we are still on an ad hoc policy basis.

We ask, why did such a carefully crafted legislative direction fail in fulfilling its purpose and objectives? Evidence points to the fact that part of that failure may be due to the lack of adequate oversight by the Congress. We commend this committee for recognizing the importance of that oversight and scheduling this hearing. It will serve a useful purpose in highlighting the problems of the mining and minerals industry.

We would indeed be remiss if we did not also express our gratitude to this committee for its outstanding leadership in the shepherding of the 1980 and 1984 acts through Congress. In addition, the committee has shown continuing concern for our national minerals and materials situation through thoughtful legislative and oversight hearings on these vital issues.

But a major portion of the responsibility for the advancement of the national minerals policy lies with the executive branch. Although attempts were made at bureau levels, the impacts of their findings were lost in the bureaucratic shuffle, and, in fact, according to a report from the House Mines and Mining Subcommittee, by a denial of authority by parts of the executive branch. This report, entitled "U.S. Minerals Vulnerability: National Policy Implications," documents the denial of authority by the Department of the Interior and further states:

> In the face of unequivocal Congressional directive to do so, the Interior Department has made no effort to develop a system for identifying, quantifying, and evaluating the impact of proposed Federal actions on the nation's non-fuel mineral resources. The result is that minerals now stand alone as the most neglected U.S. renewable and nonrenewable resources.
>
> Notwithstanding the clarity of the statutory language of the 1970 act and the fundamental purpose of its accompanying legislative history, the Department of the Interior has chosen, for a full decade, to abdicate its assigned role and responsibility.
>
> The inactivity by the executive branch under the 1970 act led Congress to passage of the National Materials and Minerals Policy, Research and Development Act of 1980. This act, in addition to reiterating the principles of the 1970 act, was more prescriptive in its direction and gave clear direction on specific actions to be taken by specified agencies and bureaus.

I can say that, in my experience with the present Department of Interior executives, they are trying to do something about this, as evidenced by the appointment of the Mott committee and the cooperation that we have had from the Secretary.

I can almost hear Jack Schmitt now at the Albuquerque hearings state that the 1980 act would have to be in more detail than the 1970 act because the 1970 act was just too simple. It just said what should be done, and Jack felt that we are going to have to go into detail to tell these people what we really wanted. So, the 1980 act was enlarged, and I have a feeling that maybe you all felt the same thing, because I noticed that the 1984 act is several pages longer, too.

Although a program was issued by President Reagan in 1982, again there was little or no effort to implement portions of this plan or directions specified in the 1980 act. In fact, there has been retrogression.

The plan to which I refer is the April 5, 1982 report, entitled the "National Materials and Minerals Program Plan and Report to Congress." One of its keystones was that national materials policy will be coordinated through the Cabinet Council on National Resources and Environment, a mechanism that proved ineffective.

Through the course of its experience with the implementation of the 1970 and 1980 acts, it became apparent to Congress that no single Federal entity in the executive branch had the authority and responsibility for establishing critical materials policy and for coordinating and implementing that policy. The National Critical Materials act of 1984 was enacted to provide that leadership under the direct aegis of the President.

Where do we stand today, more than a year after the passage of the National Critical Materials act? We have no National Critical Materials Council. We have no executive director. We see no evidence that the primary responsibilities of the Council have been delegated or assumed by other Federal entities except a recent recommendation by the National Security Council to set new goals for the stock pile and to sell off critical and strategic materials from it. In other words, we see no effort at all to implement the will of Congress.

The myriad problems which face the minerals industry and the role of the Federal Government under the 1970 act hardly require a recital to the members of this subcommittee. However, I would briefly suggest some areas where immediate or short-term solutions are needed and involve coordinated Federal effort.

One, development of an executive order for implementation of the national minerals and material policy.

Two, consideration of the capital intensive nature of the mining and minerals industry in development of tax policies to provide tax credits on capital spent on pollution abatement equipment and for increased operating costs resulting from environmental and health and safety regulations.

Three, balancing of costs and benefits when establishing environmental standards.

Four, a thorough review of regulations that continue to hamper development of mines and minerals processing facilities in the area of Federal land management and health and safety.

Five, access to national materials needs related to scientific and technological changes over the next 5 years.

Six, assess the availability and adequacy of the supply of technically trained personnel necessary for materials research and development.

Seven, to provide the basis of requirement of the access to the public domain for prospecting and discovery of needed materials, to provide for the security of tenure following a discovery, and to reduce the wilderness and de facto withdrawals of the public domain, and to reduce and do away with the regulations which are not cost effective, and to review the role of the multilateral development banks to which the United States contributes. This includes the World Bank group and the IMF. Loans should be evaluated on the same basis from these organizations as a private company loan from a commercial bank and also on their efforts on material conditions.

Nine, to identify critical industrial sections threatened with becoming endangered.

Ten, to pursue our foreign policy in such a way to ensure free and fair market access to strategic and critical materials, especially when they are not available from domestic sources.

Mr. Chairman and members of the subcommittee, we don't need any more studies of the domestic mineral situation in the United States. In fact, we don't need any more analysis, nor do we need any more legislation.

What we do need is a focus of the Federal activities on the problems of the mining and minerals industry and responsible leadership and coordination of the vast resources of the Federal Government to keep these basic industries of paramount importance to the national security and well being of this Nation from being lost. Once lost in this technologically advanced age, the prospects of regaining these vital and basic industries range from poor to none.

I want to thank you for being able to appear today. I would be happy to answer any questions.

[The prepared statement of Mr. Ary follows:]

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PRESIDENT

Statement Of

AMERICAN MINING CONGRESS

by

T S ARY

President, Minerals Exploration Division,

Kerr-McGee Corporation

Chairman, Minerals Availability Committee,

American Mining Congress

Before the

Subcommittee on Transportation, Aviation and Materials

of the

Committee on Science and Technology

U.S. House of Representatives

Washington, D.C.

October 8, 1985

Mr. Chairman and Members of the Subcommittee:

My name is T S Ary. I am President of the Minerals Exploration Division, Kerr-McGee Corporation. I serve as Chairman of the Minerals Availability Committee of the American Mining Congress and am testifying today on its behalf.

The American Mining Congress is an industry association that encompasses: (1) producers of most of America's metals, coal and industrial and agricultural minerals; (2) manufacturers of mining and mineral processing machinery, equipment and supplies; and (3) engineering and consulting firms and financial institutions that serve the mining industry.

Before directly discussing implementation of the National Critical Materials Act of 1984 and the other legislation that should have provided the basis for a sound United States minerals policy, and so that this Subcommittee can more clearly understand the reasons for our comments, it is necessary to review briefly the economic condition of the mining industry and its effect upon the national security and economic well-being of the nation.

ECONOMIC CONDITION OF THE MINING INDUSTRY

The economic state of the mining industry has become front-page news. The cover story of the December 17, 1984, issue of Business Week aptly stated that the recovery of 1983-84 largely bypassed producers of copper, iron ore, nickel, lead, zinc and molybdenum. Senator Domenici, in his excellent statement which appeared in the January 22, 1985, Congressional Record, points out that the United States is in danger of losing 75 percent of its copper industry, 40 to 50 percent of its iron-ore industry, and that 90 percent of the U.S. potash industry is in peril. Since that time, except for industrial minerals, coal and precious metals, the situation has further deteriorated.

Certainly, these trends are of vital concern to the mining and mineral processing industries in the United States. But more importantly, they impact dangerously upon the national security and economic well-being individually of each citizen and corporately upon the nation.

From a national security standpoint, unless positive actions are undertaken by government, the country faces a devastating minerals crisis. The United States has become increasingly dependent on foreign sources for many strategic minerals, base metals and industrial materials that are essential to the nation's security and industrial base. Some of these foreign sources are countries subject to economic, social and political instability. Many are located at the far end of vulnerable shipping lanes. These factors make this nation liable to cut-offs of supply and to gyrations of price.

A few facts and figures illustrate the effect of reduced mineral production upon our national well being. In 1981, U.S. metals mining was an $8.9 billion enterprise. By 1983, it had shrunk to just $5.9 billion. The jobs provided exceeded 109,000 in 1981. At the beginning of 1985, what remained was a workforce of about 44,800. And the prognosis is for further reduction.

The Committee will recognize the parallel between the difficulties facing the mining industry and the current plight of the nation's farmers, a subject intensely discussed in the halls of Congress in recent weeks. The farmers and miners of this country are the source of the basic materials for all economic activity.

MINERAL POLICY

There has been no lack of mineral and material policy studies; several have been issued from within the federal government and from other sources. All these studies start with acknowledgement of the national significance of an adequate mineral supply and the importance of a strong domestic industry. Although most of the studies agree that a degree of foreign imports provides least-cost benefits to the consumer, at the same time, they point out the pitfalls of import dependency and how such dependency forfeits freedom to make political, economic and defense decisions.

South Africa

After a dozen years of effort, the Congress enacted the Mining and Minerals Policy Act of 1970, clearly a policy declaration that provided a means of not only addressing the changes in reliability of foreign supplies but, more importantly, establishing a national value of domestic production. This clear and concise statement established a set of Congressional priorities against which the Executive Branch is to weigh other objectives and proposed actions. The Congress declared that mining and mineral activities lie solely within the private sector, but the federal government is responsible for fostering and encouraging those activities. The Congress clearly intended that the individual and collective impacts on the mining sector of other national priorities be evaluated completely and carefully in full recognition both of the importance of mining and the consequences of contemplated federal actions.

Why did such a carefully crafted legislative direction fail in fulfilling its purpose and objectives? Evidence points to the fact that part of the failure may be due to lack of adequate oversight by the Congress. We commend this Committee for recognizing the importance of that oversight and scheduling this hearing. It will serve a useful purpose in highlighting the problems of mining and the minerals industry.

We would indeed be remiss if we did not also express our gratitude to this Committee for its outstanding leadership in shepherding the 1980 and 1984 Acts through the Congress. In addition, the Committee has shown continuing concern for our national minerals and materials situation through thoughtful legislative and oversight hearings on this vital issue.

But a major portion of the responsibility for advancement of the national minerals policy lies with the Executive Branch. Although attempts were made at bureau levels, the impacts of their findings were lost in the bureaucratic shuffle, and, in fact, according to a report from the House Mines and Mining Subcommittee, by a denial of authority by parts of the Executive Branch. This report, entitled "U.S. Minerals Vulnerability:

National Policy Implications" (Committee Print No. 9, 96th Congress, 2nd Session) documents the denial of authority by the Department of the Interior and further states:

> In the face of a unequivocal Congressional directive to do so, the Interior Department has made no effort to develop a system for identifying, quantifying, and evaluating the impact of proposed Federal actions on the Nation's nonfuel mineral resources. The result is that minerals now stand alone as the most neglected U.S. renewable and nonrenewable resources....
>
> Notwithstanding the clarity of the statutory language of the [1970] Act and the fundamental purpose of its accompanying legislative history, the Department of the Interior has chosen, for a full decade, to abdicate its assigned role and responsibility.

The inactivity by the Executive Branch under the 1970 Act led Congress to passage of the National Materials and Minerals Policy, Research and Development Act of 1980. This Act, in addition to reiterating the principles of the 1970 Act, was more prescriptive in its direction and gave clear direction on specific actions to be taken by specified agencies and bureaus.

Although a program plan was issued by President Reagan in 1982, again there has been little or no effort to implement portions of this plan or directions specified in the 1980 Act. Indeed, there has been retrogression.

The plan to which I refer is the April 5, 1982 report entitled the "National Materials and Minerals Program Plan and Report to Congress". One of its keystones was that national materials policy will be coordinated through the Cabinet Council on National Resources and Environment, a mechanism that proved ineffective.

Through the course of its experience with the implementation of the 1970 and 1980 Acts, it became apparent to the Congress that no single federal entity in the Executive Branch had the authority and responsibility for establishing critical materials policy and for coordinating and implementing that policy. The National Critical Materials Act of 1984 was enacted to provide that leadership under the direct aegis of the President.

Where do we stand today, more than a year after the passage of the National Critical Materials Act? We have no National Critical Materials Council. We have no executive director. We see no evidence that the primary responsibilities of the Council have been delegated or assumed by other federal government entities. In other words, we see no effort at all to implement the will of the Congress.

The myriad problems which face the minerals industry and the role of the federal government under the 1970 Act, hardly requires a recital to the Members of this Subcommittee. But I would briefly suggest some areas where immediate or short-term solutions are needed and involve coordinated federal effort.

- o Development of an Executive Order for implementation of national minerals and material policy.
- o Consideration of the capital intensive nature of the mining and the minerals industry in development of tax policies.
- o Balancing of costs and benefits when establishing environmental standards.
- o A thorough review of regulations that continue to hamper development of mines and minerals processing facilities in the areas of federal land management and health and safety.

5 6 7 8 9 10.

Mr. Chairman and Members of this Subcommittee, we don't need any more studies of the domestic minerals situation in the United States. We don't need any more analyses. In fact, we don't need any more legislation.

What we do need is a focus of federal activities on the problems of the the mining and minerals industry and responsible leadership and coordination of the vast resources of the federal government to keep these basic industries of paramount importance to the national security and economic well-being of this nation from being lost. Once lost, in this technologically advanced age, the prospects of regaining these vital and basic industries range from poor to none.

I would be most happy to answer your questions.

Mr. BROWN. Thank you very much, Mr. Ary. We will have some questions for you after Mr. Romagnoli.

STATEMENT OF EMIL A. ROMAGNOLI, NATIONAL ASSOCIATION OF MANUFACTURERS, WASHINGTON, DC

Mr. ROMAGNOLI. Thank you, Mr. Chairman.

My name is Emil Romagnoli. I am manager of Regulatory Affairs for ASARCO Inc., a miner and processor of nonferrous metals with operations in both the United States and overseas. I am also chairman of the Nonfuel Minerals Task Force of the Natural Resources Committee of the National Association of Manufacturers, and my statement this morning is on behalf of the National Association of Manufacturers.

The NAM is a voluntary business association of over 13,500 corporations, large and small, that are located in every State. Members range in size from the very large to over 9,000 smaller manufacturing firms, each with an employee base of less than 500. NAM member companies employ 85 percent of all workers in manufacturing and produce over 80 percent of the Nation's manufactured goods. NAM is affiliated with an additional 158,000 businesses through its Associations Council and the National Industrial Council.

Our organization has had a longstanding interest in the economic health and welfare of our domestic extractive industries. In fact, the Natural Resources Committee of NAM is unique in that the committee represents both users and producers, large and small, of domestic natural resources. The committee's concerns revolve around assuring America's industrial base of accessible, adequate, and affordable supplies of raw materials for manufacturing.

Five years ago, the NAM Nonfuel Minerals Task Force was formed to address a growing problem, that is, our increasing reliance on foreign, sometimes politically unstable, sources for supplies of basic industrial minerals and materials. This problem, then and now, is well documented and well known.

However, actions over the past 5 years with regard to addressing supply disruptions, long-range materials uses and needs, and the policy analyses needed to make these determinations have been intermittent, at best. It is the view of our Nonfuel Minerals Task Force that these problems cannot be addressed on an ad hoc basis. There is still no permanent office at a suitably high level in the executive branch to deal with these critical issues.

Thus, it has long been our position that an organization was needed at the highest levels of the executive branch to deal with the importance of minerals and materials to our national defense and our national economy and to evaluate the impact of other national policies upon the materials and minerals sectors

The NAM both supported and worked for enactment of title II of Public Law 98-373 which formed the National Critical Materials Council. NAM was especially vocal within the administration in urging the establishment of a Critical Materials Council, and our staff argued for appropriations of funds to organize and implement the Council.

We now feel we should get on with the job of implementing the Critical Materials Act as soon as possible and to put into place the Critical Materials Council and a Council staff.

What do we feel should be the role of this Council? Initially, with respect to research and development, the Council should carry out its statutory requirements of coordinating materials and minerals research programs within the Government, including evaluating Federal research programs in order to recommend new areas for Government research.

Moreover, the Council might also evaluate private sector research programs in an effort to avoid duplication and to seek ways in which Government would enter into cooperative programs with the business community to combine resources toward important materials and minerals research projects. At a time when all programs, both private and public, are suffering cutbacks in funding and resources, more efficient and complimentary use of Government and private sector money, manpower, and facilities would be a useful contribution.

There is some precedent for this. The Bureau of Mines, for example, Mr. Chairman, worked with the aluminum industry in developing onshore sources of nonbauxitic ores for aluminum. There are many examples of the Bureau of Mines working with the mining industry toward safety and health technology, and I think there is sufficient precedent to try to undertake complimentary kinds of programs.

Research is not the only answer to our country's minerals and materials problems, however. An important function and responsibility that we see the Council providing would be to have an ongoing analytical capability to alert policymakers at the highest levels of the executive branch to the potential impacts that Government programs and policies are having on the minerals supply and demand picture, that is, upon all aspects of the materials cycle.

Ideally, the Council and its Executive Director and staff would serve as an early warning system for evaluating regulatory policies, trade policies, policies that affect access to the public lands, tax policies, and foreign policy considerations, as well as U.S. participation in the international financial institutions such as the International Monetary Fund and World Bank—that is, for evaluating all of these policies in the context of their effects and implications for minerals and materials. We would especially hope that consideration could be given to the effects of Government actions upon the international competitive position of our U.S. minerals and materials supply and upon the minerals and materials consuming sectors.

As an aside, however, let me say that these are very trying times indeed for the basic industries and for nearly all extractive and manufacturing sectors of our Nation's economy which Mr. Ary talked about earlier. America's capacity to mine and process nonfuel minerals has faced prolonged depressed conditions and serious competitive difficulties which have forced massive cutbacks in our production capacity for many important minerals. Our capability to produce copper, lead, and molybdenum, to name just a few, has suffered a serious reduction. At the same time that our imports and our fundamental reliance upon foreign sources have grown.

The great tragedy in all of this is that this reduction in our ability to produce those materials for which the United States should have a competitive advantage and a resource rich position has occurred at the same time that our dependence upon foreign sources for materials which historically must be imported is being threatened. Those materials include sources in central and southern Africa, for example, for cobalt, chromium, manganese, and platinum-group metals. Just as the availability of these more import-dependent materials provides a source of concern to policymakers and consuming industries alike, we should also be concerned for the future availability of metals and materials produced domestically which we normally have taken for granted.

But problems we have experienced in the basic industry sectors such as mining and steel are not unlike competitive problems that have also been occurring in the more valued added sectors of our economy. We have seen, for example, serious competitive difficulties and rapidly rising imports in the fabricating and intermediate product stages of production as well as the serious competition that has been affecting the equipment manufacturers of our country.

The NAM would hope that the new National Critical Materials Council might consider both the competitiveness of our materials and minerals supplying industries along with the role of materials and minerals in the competitiveness of our other manufacturing sectors. We would also hope that the Council, through special advisory panels, could include private sector members, including representation from the materials producing and consuming sectors, either permanently or on a rotating basis. The idea would be to institutionalize a procedure for getting input from the business community which NAM deems essential to the formation of sound policy.

Our hope ultimately lies, however, in the prospect that this Council will soon be appointed. Unless it is, this testimony will become academic. It was not until August 15 of this year, a full 13 months after enactment of the National Critical Materials Act, that the President signed an appropriations measure earmarking $200,000 for the Council. We remain optimistic that another $500,000 in the fiscal year 1986 House Treasury and Postal Service Bill, H.R. 3036, will remain intact through conference committee.

But while these funding debates continue, the Council work remains undone. Already, the April 1, 1985, initial reporting deadline, as spelled out in your statute, has passed. Meanwhile, the clock continues to tick on the sunset provisions of this Council which is authorized only through September 30, 1990.

NAM, for its part, promises to pursue funding and appointment of the Council and to ensure that our materials needs are met into the next century and that sound minerals policies will be developed in order to ensure the economic, defense, and manufacturing needs of this country.

In closing, I would like to thank the members of this committee for this opportunity to provide the views of the NAM and to express our appreciation to the committee for inviting us to deliver testimony on this important issue. Let me also extend our thanks to the committee membership for its persistent and strong leadership in continuing to deal with the materials and minerals problems, especially to the hard work of Mr. Glickman toward winning enactment of the National Critical Materials Act and to your colleague, Mr. Skeen, for his efforts in ensuring that appropriations were included for the Council in the fiscal year 1985 supplemental and the fiscal year 1986 Treasury appropriations measure.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Romagnoli follows:]

National Association of Manufacturers

TESTIMONY OF
THE NATIONAL ASSOCIATION OF MANUFACTURERS

BY
EMIL ROMAGNOLI
ASARCO, INC.

BEFORE THE
SUBCOMMITTEE ON TRANSPORTATION,
AVIATION AND MATERIALS

OF THE
COMMITTEE ON SCIENCE AND TECHNOLOGY,
U.S. HOUSE OF REPRESENTATIVES

OCTOBER 8, 1985

1776 F Street, N.W. • Washington, D.C. 20006 • (202) 626-3700

TESTIMONY OF
THE NATIONAL ASSOCIATION OF MANUFACTURERS
BY EMIL ROMAGNOLI
ASARCO, INC.
BEFORE THE
SUBCOMMITTEE ON TRANSPORTATION,
AVIATION AND MATERIALS
OF THE
COMMITTEE ON SCIENCE AND TECHNOLOGY,
U.S. HOUSE OF REPRESENTATIVES
OCTOBER 8, 1985

Good Morning, Mr. Chairman.

My name is Emil A. Romagnoli. I am manager of Regulatory Affairs for ASARCO Incorporated, located at 180 Maiden Lane, New York, New York. I am also chairman of the Nonfuel Minerals Task Force of the Natural Resources Committee of the National Association Manufacturers (NAM).

NAM is a voluntary business association of over 13,500 corporations, large and small, located in every state. Members range in size from the very large to over 9,000 smaller manufacturing firms, each with an employee base of less than 500. NAM member companies employ 85 percent of all workers in manufacturing and produce over 80 percent of the nation's manufactured goods. NAM is affiliated with an additional 158,000 business through its Associations Council and the National Industrial Council.

NAM has had a long-standing interest in the economic health and welfare of our domestic extractive industries. In fact, the Natural Resources Committee of NAM is unique in that it represents both users and producers, large and small, of domestic natural resources. The committee's concerns revolve around assuring America's industrial base of accessible, adequate and affordable supplies of raw materials for manufacturing.

In 1980, the NAM Nonfuel Minerals Task Force was formed to address a growing problem -- our increasing reliance on foreign, sometimes politically unstable, sources for supplies of basic industrial minerals and materials. This problem, then and now, is well documented.

However, actions over the past five years with regard to addressing supply disruptions, long range materials uses and needs, and the policy analyses needed to make these determinations have been intermittent. It is the view of NAM's Nonfuel Minerals Task Force that these problems cannot be addressed on an ad-hoc basis. There is still no permanent office at a suitably high level in the Executive Branch to deal with these critical issues.

why?

As a result, it has long been our position that an organization was needed at the highest levels of the Executive Branch to deal with the importance of minerals and materials to our national defense and national economy, and to evaluate the impact of other national policies upon the materials and minerals sector.

The National Association of Manufacturers both supported and worked for enactment of Title II of the National Critical Materials Act of 1984. NAM was especially vocal within the Administration in urging the establishment of a critical materials council, and NAM staff argued for appropriation of funds to organize and implement the council. (Mr. Skeen)

NAM now feels we should begin the job of implementing the Critical Materials Act as soon as possible, and put into place the Critical Materials Council and Council staff.

But what should be the role of this council? Initially, with respect to research and development, the council should carry out its statutory requirements of coordinating materials and minerals research programs within the government, including evaluating federal research programs in order to recommend new areas for government research. Moreover, the council might also evaluate private sector research programs in an effort to avoid duplication and to seek ways in which government would enter into cooperative programs with the business community to combine resources toward important materials and minerals research projects. In a time when all programs, both private and public, are incurring cutbacks in funding, more efficient use of government and private sector money, manpower, and facilities would be a useful contribution.

Research is not the only answer to our country's minerals and materials problems, however. An important function and responsibility that we see the Council providing would be to have an ongoing analytical capability to alert policy-makers at the highest levels of the Executive Branch to the potential impacts that government programs and policies are having on the minerals supply and demand picture -- i.e., upon all aspects of the materials cycle. Ideally, the Council and its Executive Director and staff would serve as an early warning system for evaluating regulatory policies, trade policies, policies affecting access to the public lands, tax policies, foreign policy considerations, and U.S. participation in international financial institutions such as the International Monetary Fund and World Bank -- all in the context of their effects and implications for minerals and materials. We would especially hope that consideration could be given to the effects of government actions upon the international competitive position of U.S. minerals and materials supply and upon minerals and materials consuming sectors.

As an aside, however, let me say that these are very trying times indeed for the basic industries and for nearly all manufacturing sectors of our nation's economy. America's capacity to mine and process nonfuel minerals has faced prolonged depressed conditions and serious competitive difficulties which have forced massive cutbacks in our production capacity for many important minerals. Our capability to produce copper, lead, and molybdenum, to name just a few, has suffered a serious reduction. At the same time our imports and our fundamental reliance upon foreign sources have grown. This reduction in our ability to produce those materials for which the U.S. should have a competitive advantage and a resource-rich position has occurred at the same time our foreign sources for materials that historically must be imported are being threatened, including sources in Central and Southern Africa for cobalt, chromium, manganese, and platinum-group metals. Just as the availability of these more import-dependent materials provides a source of concern to policy-makers and consuming industries alike, we should also be concerned for the future availability of metals and materials which we take for granted.

But problems we have experienced in the basic industry sectors such as mining and steel are not unlike competitive problems that have also been occurring in the more valued-added sectors of the economy. We have seen, for example, serious competitive difficulties and rapidly rising imports in the fabricating and intermediate product stages of production, as well as serious competition affecting equipment manufacturers of America. The NAM would hope that the new National Critical Materials Council would consider both the competitiveness of our materials and minerals supplying industries and the role of materials and minerals in the competitiveness of our other manufacturing sectors. We would also hope that the Council, though special advisory panels, could include private sector members, including representation from the materials producing and consuming sectors either permanently or on a rotating basis. The idea would be to institutionalize a procedure for getting input from the business community, which NAM deems essential to the formation of sound policies. — This is part of the law.

Our hope ultimately lies however, in the prospect that this Council will soon be appointed. Unless it is, this testimony is academic. It was not until August 15 of this year, a full 13 months after enactment of the National Critical Materials Act, that the President signed an appropriations measure earmarking $200,000 for the Council. We remain optimistic that another $500,000 in the FY '86 House Treasury/Postal Service bill, H.R. 3036, will remain intact through conference committee. But while these funding debates continue, the Council's work remains undone. Already, the April 1, 1985 initial reporting deadline as spelled out in the statute, has passed. Meanwhile, the clock continues to tick on the sunset provisions of this Council, which is authorized only through September 30, 1990, unless otherwise authorized by Congress. NAM, for its part, promises to pursue funding and appointment of the Council, to insure that our materials needs are met into the next century, and that sound minerals policies are developed in order to insure the economic, defense, and manufacturing needs of this country.

In closing, I would like to thank the members of this Committee for this opportunity to provide the views of the National Association of Manufacturers, and to express our appreciation to the Committee for inviting NAM to deliver testimony on the important issue of critical materials and the implementation of the National Critical Materials Act of 1984. Let me also extend our thanks to the Committee membership, for its persistent and strong leadership in continuing to deal with the materials and minerals problems, and to the hard work of Representative Glickman in particular toward winning enactment of the National Critical Materials Act, and to your colleague, Rep. Joe Skeen, for his efforts in insuring that appropriations were included for the council in the FY'85 Supplemental and the FY '86 Treasury appropriations measure.

* * *

Mr. **Brown**. Thank you very much, Mr. Romagnoli. We always appreciate a word of praise for our hard-working colleagues who shepherd some of these issues through.

Mr. Lewis, do you have any questions?

Mr. **Lewis**. Just a couple, Mr. Chairman, thank you.

I have a general question for all three of you gentlemen. How do you view your organizations' role with the Council and how do you anticipate interfacing with the Council?

Mr. **Romagnoli**. We would hope the NAM could provide an advisory role in the Council. Our task force and our Natural Resources Committee, I think, has a unique position in that we have representatives of both the mining industries and the extractive industries, and we can muster resources from those industries, as well as most of the major defense contractors, and the consuming sectors, too. So, I think we could provide a unique contribution in an advisory sense to the Council.

Mr. **Ary**. I think we would second the same thing that Emil has said for the American Mining Congress. The subject is dear to our hearts. In fact, it is our business. We feel that out of the expertise that is in the United States, all of the expertise that is needed is within our industry. If requested, we stand ready to help, and if not requested, we stand ready to talk back to them.

Mr. **Lewis**. I like your candor.

Mr. Ford.

Mr. **Ford**. I have to echo the same sentiments as my colleagues here with the additional note that we in the Federation of Materials Societies represent the professional and technical societies in the materials community and act as a liaison and communications link to very, very many professionals in this ball game. We can, therefore, provide and hope to and, as Mr. Ary said, we will provide unless told not to input to the Council to assist them in formulating their plans and implementing them and getting them through the executive branch so that something more than paperwork comes out of it.

Mr. **Lewis**. What do you think is the most important task of the Council? What problems should it address first after formation?

Mr. **Ford**. I will start that. It is a very difficult question because there are so very many important agenda items for the Council. However, coordination of R&D work within the Federal agencies is very, very important; 14 agencies, I think, are the number that you folks have quoted to us this morning. There are too many to name, too many for any of us to know all of them even out here in industry. We must coordinate that work and make sure that there is not duplication of effort. There cannot be a lack of duplication when there are so many diverse agencies involved. It just has to be. Everyone wants on the bandwagon of rapid solidification technology, of composites, of engineered ceramics, so that all these agencies feel they have to have an initiative in those up and coming advanced technologies.

A very key role for the Council would be to assure that we are getting most cost-effective use of our dollars in doing research and development in those areas.

Mr. **Ary**. I think Mr. Ford has hit a real important part here, because the coordination is very important because we have so many different agencies and different questions involved. However, before we can even coordinate any of that, we are going to have to establish some sort of a policy that makes sense. Right now, there is no way that policy can be established because these various people are fighting for turf. And everybody wants a little piece of the action, so it gets all splintered up and you just don't know where to go.

Little did I realize when I wanted to drill an oil well that I was going to have to talk to the Corps of Engineers, and the Coast Guard, and the Navy. I just don't know where to stop when I am going out.

And I see one of the big things and one of the greatest things that could happen now to this Council is to depoliticize this whole area of natural resources, and strategic, and critical materials. The policy—no, not the policy—the actions that I see taken now have nothing to do with the problem of natural resources. It is what is the political implication going to be and then we will take that action that is going to give us the least friction.

My feeling is if they don't like to make these tough decisions and bite the bullet, let them get out. They ran for office; they ought to face up to it.

Mr. **Romagnoli**. I guess I would second both of those sentiments. I think we would see the most important contribution of the Council to provide some mechanism for evaluating the role of Government policies on mineral supply, and materials supply, and their use. We have things that are occurring right this moment and that occur all the time initiated by Government that have dramatic impacts on all stages of the materials cycle. The materials or minerals impacts, including some of the research and engineering impacts, are never considered.

I am not naive enough to think that we can completely change that and take politics out of the picture or to have minerals and materials being the dominant force in policy, but I guess we would like to see them at least considered and to be a place where we can at least air that point of view or air a materials or minerals point of view in the policymaking process.

Second, I think the research and development is becoming increasingly important. I think all of us are suffering very severe cutbacks in the funds available to conduct either private or public research and I guess the NAM feels that the Council could play a real role in trying to focus the research needs of at least the public sector.

Mr. **Ford**. If I could add to that, there is another very important purpose of the 1984 act that is the third purpose enumerated, to stimulate innovation and technology utilization in basic industries. One of our great concerns in the materials community is that we are very effective in R&D, that is, in the inventive portion of the innovative cycle. We can invent things very well. We invented continuous casting.

However, we don't implement them very well. We don't take them across what we are calling the technology bridge and which we are going to deal with in this 1986 biennial conference. We don't take that invention across that technology bridge to commerce.

We are looking for the reasons and the barriers. The present administration does not put much emphasis on that. They say that is the role of the private sector to take the basic research, and development, and implement it, and make it a commercial success. However, we in the private sector have demonstrated that we don't do that very well.

So, the Council ought to play an important role in, No. 1, determining or helping to determine what are the barriers to that technology transfer and then how to utilize it, especially in the basic industries. We cannot exist without our basic industries.

Mr. Ary. This is very important, because the industry, as we find ourselves now, are in a very poor position for capital formulation. Yet, we look at the present tax proposals, and we are doing away with any incentives to do just what Dr. Ford has said, and that is to take the invention, and go on into the next phase, and use it for production. We can't get there because we just are not able to develop the capital necessary to move that next step.

Yet, we are seeing tax credits denied. We are seeing all types of barriers put up. The Council could coordinate all of these types of things together to try to fulfill the 1970, 1980, and 1984 acts, and that is to establish and see to it that we have a viable metal, and minerals, and strategic materials industry. And it is going to take all of those things, not just the raw materials and not just the manufacturing, but the whole complex.

Mr. Romagnoli. If I may, Mr. Lewis, to add a footnote to this, the principal thing I guess I believe that has given us the competitive edge or has allowed us to remain competitive in the world market and many of the mineral commodities that I have experience with is the fact that we have been able to have productivity improvements based on technology gains through process improvements and through production innovation that has allowed us to keep up with declining ore grades or allowed us to keep up with competition from higher ore grades overseas in many of these commodities. Copper and molybdenum come to mind, but I am sure Mr. Ary could think of many others.

The problem that we face now is that with the terrible debt burden that we have all incurred and with the terrible squeeze on our resources, I fear we are going to begin losing that competitive edge and we are going to become higher cost producers, whereas, Government-owned production elsewhere in the world receives direct subsidies from their Governments in this area.

Mr. Lewis. Well, all of your testimony indicates a very ambitious agenda for this Council. Do you think the Council should be expanded before it is formed, or do you think we have a pretty good handle on it right now, both with the size of the Council and the funding for the Council?

Mr. Ary. I don't think it makes any difference what size it is; it is just how active they are going to be and what kind of latitude they have. If they are going to be told what to do, then it doesn't make any difference if you have 1 or 50.

If they are going to have a free rein to make recommendations and to have those recommendations looked at, I think a three-member Council can do it if they utilize the expertise they have. The Bureau of Mines, under Bob Horton, and the USGS, under

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Gordon Peck, have been very professional in the last few years. Once they were allowed to get out and to do these things, as Mr. Broadbent stated a few minutes ago, it is really encouraging to see this. They have the people and the availability of these people. The advisory panels, as everybody said, they are willing to help.

I am not a red hot—although I am on Admiral Mott's committee, I like that type of committee better than I did the one that Mr. Boyd had in 1972 and 1973. They went 2 years before they made a recommendation. By the time the recommendation was made, it was cold. Here, Admiral Mott's committee is coming out on a regular basis and they have this deadline of a 2-year unless otherwise extended.

There is a lot of help that the three-member commission can have if they have the right to move in that direction.

Mr. Ford. I think that is very important. As taxpayers, we all ought to worry about the increasing of the bureaucracy, and I think that is where the Council should take our offer for assistance, call on us to help to formulate the policies, to help to implement and work on the individual agenda items. We want to be involved. The private sector wants a cooperative environment with Government and academia. So, don't expand the bureaucracy; use the resources that are offered to you from all sectors.

Mr. Romagnoli. If I could add to that, I worked for the Government several hundred years ago, and my experience with Government organizations is that the smaller ones and the ones that are leaner and meaner are the ones that are more effective. When they start expanding bureaucracies and you start having to worry about clearing memoranda and all that stuff, I think they become less effective. The most effective ones are the smaller organizations.

I think the staff size that you propose in the statute could do the job.

Mr. Lewis. Thank you, gentlemen.

Thank you, Mr. Chairman.

Mr. Brown. Thank you, Mr. Lewis.

Gentlemen, we really want to be constructive in our approach to problems here in the Congress even though we don't always look like it. We have a situation here, and each of you has identified political obstacles to movement in this area in one way or another, but essentially we have a situation in which we have an administration which is very firm about not wanting the Federal Government to grow, and we appreciate that, not wanting the Federal Government to get involved with things that private enterprise should be doing, and we appreciate that.

And we have a problem when we establish a program such as we have here in convincing the policymakers in the executive branch—and I think we are talking basically about OMB here—that this is not a program that leads to growth in government but better utilization of the programs that are going on at the present time. And it is not usurping the function of private industry but is helping to build that cooperative bridge between government and private industry which will enable private industry to function more effectively.

We must not have done a good job in selling that idea with this particular program, because we don't seem to have moved very far.

Have you got any ideas about what we can do to get that idea across?

Mr. **Ary**. I think your hearing that you are holding here right now is the first step. We have had very little input in trying to get this off base. We talk a lot about it and it gets to a point, and it gets stopped. And I don't know why. I just feel that maybe the advisors to the President have not been advising properly. After listening to Dr. McTague this morning, I have a feeling that there is a small inner circle that is just trying to enlarge their influence in this materials area.

Mr. **Brown**. Well, this groups responds in some situations, the steel initiative, for example. This is an ad hoc reaction to a very pressing political situation in this country. It could easily probably have been done under the aegis of this program without making a special ad hoc operation out of it.

But the steel industry and its pressing needs, which all of the mineral industries have actually, and metal processing industries, apparently has more political punch than the broad based needs of the entire industry has. I can't figure that out, but there is probably a reason for it somewhere.

Mr. **Ford**. I would say that keeping the heat on is very important. This whole initiative started many, many years ago but it grew in proportion in the late seventies. Why did it grow in proportion then? Because there was an awareness and a concern for strategic and critical materials. We were in a material short economy then, and everybody worried about it.

We are not in that kind of an economy today, and so nobody worries about it. The problem disappears. We in America react to crises only perhaps. We cannot allow ourselves to become complacent because today we have plenty of all the materials we need, excesses of most of them as our mineral producing industries know.

So, you have to keep the heat on. We all have to keep the heat on and educate and continue to press for what we think we know is right.

Mr. **Brown**. Well, I don't think there is any question but what the country would have been better off if we had foreseen and anticipated and planned for the oil shortages of the early seventies. It would have avoided the kind of catastrophic reaction that we actually developed and the major economic shifts that were necessary in order to react to that shortage.

Our purpose in legislation of the sort that we are talking about here is to do what we didn't do in connection with the oil shortages. I think we have to persuade the administration that it is important to do this, any administration.

Mr. **Ford**. In fact, if they implement the Council as they have indicated this morning they are going to do, that will be a giant step forward over the last 18 months' hesitation.

Mr. **Brown**. I would just like to raise a couple of points about organization. Dr. McTague and others have indicated that OSTP might be able to do the functions that we have provided here for the critical materials council. There was some talk about the Cabinet level council doing these things, and my experience with OSTP is that it does not have the staff and the resources to actually engage in the detailed coordination of a substantive program. They have certain responsibilities related to this, including the coordination of policy that determines the relationship between all the critical scientific and technological areas, but not the detailed management of a particular sector.

The same is true with Cabinet level councils. They are just not set up to engage in the kind of detailed analysis that is required for an ongoing operational program. They are very good at resolving high level policy difficulties when different Cabinet members have different points of view about something, but not much good at the other things.

Is my analysis of this wrong, or do you gentlemen have a different point of view on this?

Mr. **Romagnoli**. I guess I would share your point of view, Mr. Chairman. I think the beauty of the council idea is you both elevate the policy aspects to the highest levels and combine it with an effective staff so you get the best of both worlds. It seems to me the idea of the council was to get away from the bickering that goes on in an interagency council process such as the old Cabinet council idea.

Mr. **Brown**. There will be plenty of things for the Cabinet council to do even with this Council, because whenever you address a problem across the board in government, you are always going to bring up areas in which there are different points of view which need to be resolved at a higher level, and the Cabinet level council is a good place to do that, but it can't even act on these unless there is a responsible group that brings these to the proper level of attention, it seems to me.

Mr. **Ary**. Cabinet officers have so many more important things to do than to work with the details it takes to massage to get to that policy level.

Mr. **Ford**. I think there is an important thing that the Council called for in this act can do that a Cabinet council or OSTP cannot, and that is hopefully to provide continuity across administrations. One of the key problems is an up and down interest that we find with changing administrations. Hopefully, although not guaranteed because the President does name the Council, there will be a continuity across administrations, administrative changes, so that a long-range outlook can prevail.

Mr. **Romagnoli**. If I could add, Mr. Chairman, I think some of this has to do with having a will. I think the administration has to have a will to accomplish whatever the policy is. I remember when Secretary Morton was chairman of the Energy and Natural Resources Council in both Interior and Commerce, and he was in effect an energy czar even though other agencies had responsibilities, and decisions were made very quickly, but that was because the administration had the will to implement the policy that way.

Mr. **Brown**. That was because Secretary Morton was such a big man. He could enforce his will.

Mr. **Ary**. He came out of the right house.

Mr. **Brown**. Yes; but gentleman, I am not going to belabor these points. I am trying, for my own benefit, to understand where the roadblocks are here that prevent us from moving in this area, and you have helped a great deal to improve my understanding of it. I hope that we will see some action in the near future as was optimistically predicted by one of our witnesses. If we don't see some, I will give you an even better prediction that this committee will engage in additional oversight to see what is going to happen here.

Thank you very much for your help.

Mr. Ary. Mr. Chairman, will you leave the record open so we might send you materials?

Mr. Brown. We will leave the record open for 1 week or 10 days, something like that, and you may provide us with additional material. We may want to ask you some additional questions, also.

Thank you very much, and the subcommittee will be adjourned.

[Whereupon, at 11:42 a.m., the subcommittee recessed, to reconvene subject to the call of the Chair.]

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THE NATIONAL CRITICAL MATERIALS ACT OF 1984

THURSDAY, OCTOBER 10, 1985

House of Representatives, Committee on Science and Technology, Subcommittee on Transportation, Aviation, and Materials,

Washington, DC.

The subcommittee met, pursuant to recess, at 9:40 a.m., in room 2318, Rayburn House Office Building, Hon. George E. Brown, Jr. (chairman of the subcommittee) presiding.

Mr. Brown. The subcommittee will come to order.

This morning we are starting the second of 2 days of hearings on the issue of critical materials. We have already heard testimony on broad policy matters which focused principally on implementation of the National Critical Materials Act of 1984. Today we will explore in depth the crucial question of critical materials and South Africa as a specific materials policy issue.

This Nation is heavily dependent upon and therefore vulnerable to the import of a number of critical materials from South Africa. We currently import 55 percent of our chromium, 52 percent of our manganese, and 48 percent of our platinum group materials from that nation. In addition, over 60 percent of our cobalt is shipped through South Africa via rail lines in central and southern Africa. These numbers actually understate the significance of these critical materials to our Nation's economy and defense. A long-term cutoff of any or all of these materials has the potential for an economic and strategic disaster worse than the oil crisis of the 1970's.

Viewing these facts, it seems evident that the administration's current policy of constructive engagement is based in large part on the Nation's materials import dependence from South Africa. As such, our foreign policy is being held hostage to our critical materials dependence. If we continue on our present course, we can only lose now or in the long term. I would propose, instead, that we seek means of constructive disengagement in order to minimize this dependence and thus provide greater flexibility in our foreign policy with South Africa. I believe a number of steps can be taken that, in the short term as well as the long term, can achieve this goal. These include: Finding and developing alternative sources of these materials, developing new processes and substitutes, and using the strategic stockpile in the event of a cutoff.

In today's hearing I intend to explore with our witnesses the question of our import vulnerability from South Africa and alternatives to reduce or eliminate that vulnerability.

Now I would like to ask Mr. Packard, representing the minority, if he would care to make a statement at this point.

Mr. PACKARD. Thank you, Mr. Chairman. I first would like to ask unanimous consent for the material prepared—it is a study—the Office of Strategic Resources Report for Interagency Materials and Minerals, a field study to the Republic of South Africa, prepared by that agency with the Director, Robert Wilson, I would like to enter that into this hearing record.

[The material referred to follows:]

OFFICE OF STRATEGIC RESOURCES
REPORT OF INTERAGENCY MATERIALS AND MINERALS
FIELD STUDY TO THE REPUBLIC OF SOUTH AFRICA

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OFFICE OF STRATEGIC RESOURCES
U.S. DEPARTMENT OF COMMERCE
WASHINGTON, D.C.

JULY, 1985

PREFACE

The views expressed in the attached report are reported for the purpose of highlighting both the current status of South Africa's mineral and materials industries and the reliability of flows of mineral and material products to the U.S. industrial base and that of our allies. First-hand impressions relating to South Africa's role as a producer, processor and transshipper of mineral products vital to U.S. and allied defense and civil production were solicited from incountry U.S. officials and Southern African industrial executives and governmental experts. The gathering of this body of opinion together with direct observation of key production facilities provides a mosaic useful to those concerned with having the strategic minerals and materials interests of the U.S. considered in the process of formulating U.S. policy toward South Africa. This report is offered to the policy community in the hope that it will be of value in deliberations on South Africa in the months ahead. Any errors, misperceptions or inaccuracies are due to the pressure of time-constraints and are the responsibilities of the authors.

The team is much indebted to officials of the U.S. Department of State and officials of the Republic of South Africa for making arrangements for the field study. Most especially the team is indebted to the many South African industrial executives, managers and workers who provided access to key facilities and entertained open and free discussion of the many sensitive issues explored. Finally, the report should be interpreted neither as a statement of official U.S. Government policy nor as the definitive exposition of the status of U.S.-South African mineral security. Rather it should be seen as an attempt to assess the current situation vis-a-vis U.S.-South African mineral interest, an interest, which continues to evolve within a rapidly changing geopolitical context.

Robert Dale Wilson
Director
Office of Strategic Resources

John N. Ellison
Research Fellow
National Defense University

EXECUTIVE SUMMARY

During the period 11-23 May 1985 an interagency team representing the Department of Commerce and Department of Defense conducted a field study in the Republic of South Africa for the purpose of gaining first-hand knowledge of the current status and outlook of the South African minerals industry. The findings of this field study will be used to evolve a more effective interagency approach for the monitoring and assessment of U.S. minerals and materials dependency patterns and the potential impact of disruptions in the supply from primary foreign sources such as the Republic of South Africa. This analytical effort responds to the growing need of the interagency community responsible for the formulation of national minerals and materials policy options as related to defense and commercial interest of the U.S. The following represent key findings derived from the field study:

-- South Africa possesses the greatest concentration of strategic and critical materials and minerals existing in the Western world. It has evolved a world-class technical capability, managerial competency and industrial base for their exploitation.

-- The U.S. provides only 2.8% of the capital stock in South Africa. However, universal application of economic sanctions and disinvestment policies by the U.S. and other Western industrial societies might greatly impact on South African prospects for growth and development.

-- Since U.S. firms lead in providing progressive work conditions, U.S. disengagement would have widespread and undesirable effects on the upward mobility of the black populace of both South African and neighboring states.

-- Public and private leaders in South Africa are concerned with its growing isolation from the Western industrial world. But, nonetheless, at this time, these groups take the position that Western dependency on South African sources of minerals will not be manipulated by them in a retaliatory manner to counter politically motivated moves by their trading partners.

-- A favorable resolution of internal political problems could lead to the positioning of South Africa as a greater regional economic power with sufficient resources and know-how to stabilize and promote economic and social development throughout the entirety of Southern Africa.

-- Differences of opinion within the business community and between government and business leaders with regard to the adequacy and pace of change toward full political representation of all elements of the population are not accurately portrayed by experts and opinion-makers external to South Africa. There is a strong desire on the part of elements of the business community to portray their views more accurately to the U.S. public.

-- The maintenance of free market access to manganese, vanadium, chromium, platinum metals, gold, ferroalloys and cobalt produced in and/or shipped through South Africa is vital for the continuing U.S. defense buildup and for industrial preparedness in the event of a national security emergency.

-- The recent rapid decline of the U.S. mining and mineral processing industry base, together with concurrent pressures to reduce the U.S. stockpile of strategic and critical materials, has led to the reality of growing potential leverage for South Africa over the U.S. Economy.

-- In contrast to the Soviet Union which is virtually self-sufficient in strategic and critical minerals and materials the U.S. and its allies must confront an increasingly and complex vulnerable system of production and distribution. The implications of these new realities for assessing the strategic balance and for formulating national security strategic policies and programs for the U.S. and its allies are profound.

REPORT OF INTERAGENCY MATERIALS AND MINERALS FIELD STUDY TO REPUBLIC OF SOUTH AFRICA

I. RATIONALE FOR FIELD STUDY

During the past twelve months a widening circle of interagency representatives concerned with the formulation of national minerals policy has become increasingly aware of the need to assess vulnerabilities associated with potential disruption of supplies of strategic and critical materials and minerals flows emanating from the Republic of South Africa. In addition, the National Strategic Materials and Minerals Policy Advisory Committee chaired by Admiral William Mott, USN-Ret., has expressed concern for the growing dependency of the U.S. on sources of minerals and materials produced in unstable and/or vulnerable international locations. These long-standing interests in the minerals security of the U.S. together with the rapid transition of U.S. basic industries and, in some cases, the absolute decline in domestic production of strategic materials and minerals, has led to the need to place recent developments in South Africa and their inherent national security implications for the U.S. into sharper focus. As the principal agency chartered with coordinating the interagency concerns for both the producer and user segments of the U.S. industrial base, the Office of Strategic Resources (OSR), Department of Commerce, has taken the lead in attempting to definitize the new realities of the U.S. minerals and materials security position. Consequently OSR has held several business and government seminars, has conducted sectorial studies of the U.S. minerals industry, and has undertaken to draw together assessments of the national security and economic development implications of the changing minerals and materials environment for U.S. industry.

In order to gain first-hand perspectives on current and future vulnerabilities associated with the trade in minerals and materials linking the U.S. and its allies to South African supply sources Mr. Robert Dale Wilson, Director, OSR/DOC, organized an interagency field study to the Republic of South Africa which was conducted during the period 11-23 May 1985. This effort gained the support of various Federal agencies outside the Department of Commerce including: the Department of State, the Mott Committee, Department of the Interior, and the National Defense University. As a means of enhancing the prospects for linking the economic dimension of minerals availability from South Africa with national security considerations, Dr. John N. Ellison of the National Defense University, was detailed to assist in formulating the field study and its coverage of national security-related issues. Following a series of briefings by the responsible Desk Officers and other experts on South Africa at the Departments of Commerce and State, and extensive consultations with the Embassy of South Africa in Washington, D.C., Mr. Wilson and Dr. Ellison proceeded to the Republic of South Africa. A detailed itinerary of the visit appears in Appendix A.

II. ECONOMIC ENVIRONMENT AND OUTLOOK

The recent economic performance of the Republic of South Africa has been substantially affected by the general business cycle conditions in Western Europe and North America. The recessions of 1981 through 1983 induced similar conditions in South Africa. As a basic raw materials supplier, the effects of reduced demands for industrial products in the West have been reflected in South Africa in terms of negative growth in real GNP, double digit inflation, high rates of unemployment and adverse shifts in both trade and fiscal balances of the nation for 1982 and 1983. These diminished economic realities have resulted in some setbacks in terms of the rate of growth and development of many industrial sectors of the South African economy. Most particularly affected has been the further development of the processing industries designed to increase the value-added to minerals produced in the country, a major goal of the South African government. Additionally, foreign investment has been affected adversely due to the declining domestic aggregate demand for durable goods and other manufactured products. However, due to the upturn in the U.S. business cycle and later improvements on economic conditions in Western Europe, and the continuing strength of the Japanese economy, the demand for South African mineral exports has improved substantially since 1983. It is expected that overall economic conditions of South African will slowly improve in the next several years, resulting in positive developments in terms of real GNP, employment and inflation.

It is evident that the experience of three successive years of high inflation with little or no real growth has brought about a more realistic view of South Africa's long-term economic potential and that the traditional dependency on the export of gold at high international prices will not suffice in providing cash flow for the necessary investment required for national growth and stability. Thus, the need to develop a new balance between consumption and investment and to provide higher rates of savings for capital formation have become recognized as a necessities by the South African Government. Furthermore, the recent political difficulties internal to the country and the related international disinvestment campaign further underscore the need for striking a new balance between internal savings and investment. These realities were much evident throughout the field visit. The impressions derived from both government and business leaders indicated a growing seriousness of purpose in addressing the need for economic reform leading to a more self-sufficient industrial structure.

The basic strategy adopted by the Government involves providing financial incentives to develop self-sustaining internal sources of capital sufficient to build the needed mining and processing industries. As in the past, foreign investment was seen as an important potential contributor to these goals. The present structure of foreign investment originated from the European Economic Community (primarily the United Kingdom) -

54%: and North and South America, (mostly the United States) - 23%, was considered most useful to these ends. As both of these sources of foreign investment capital are considered somewhat questionable for the future, due to pressures for sanctions and disinvestments, it was nonetheless apparent that the economic structure of South Africa could remain reasonably stable with reduced flows from these sources. Specifically, the U.S. investment reached a peak of $2.6 billion in 1981 and by year-end 1983 stood at $2.3 billion. The 1983 figure represented slightly less than 2.8% of the total capital stock of South Africa. The same basic pattern of proportionality of foreign investment remains in place in 1985. Therefore, the loss of further incremental additions to the U.S. position were considered to be of marginal impact. Overall, both government and business executives seem confident of the future and largely optimistic that sanctions and disinvestment moves on the part of the U.S. and other Western nations could be absorbed and/or substituted for by other available sources of capital. Finally, the prospects for a return to economic prosperity in Western industrial societies was seen as inevitably improving the demand for South African minerals and materials export. This, in turn, is expected to result in improved economic performance to levels slightly lower than the highly prosperous period of the 1970's when minerals prices were unusually high by historical standards. Attached as Appendix B is a Basic Information Sheet on the South African economy which provides specific data on recent performance and structural evolution.

III. CONCEPT OF STRATEGIC DEPENDENCY

The two key factors which determine the degree of concern for minerals and materials availability as related to U.S. national security are: (1) the relative importance of the end use of the commodity and (2) the vulnerability of the geographical source. Among the related factors that must be considered are import dependency, number and dispersion of significant suppliers, criticality to defense production, and geological scarcity. These factors must, then, be related to contingencies which might intrude on assured access and available supplies. In the case of South Africa a number of recent developments relating to internal stability and external threats to access bring into question the degree to which U.S. policy-makers should be concerned about the vulnerability of the U.S.-South Africa minerals relationship. Of specific importance are the vast reserves of platinum, chromium, vanadium and manganese, commodities which South Africa produces on a major international scale. In addition, the vital rail network provided by South Africa constitutes the main outlet for cobalt produced in neighboring Zambia and chrome produced in Zimbabwe. Furthermore, imports of food petroleum products, machinery and spare parts destine for these nations move over this same system. It is, therefore, vital that the ports and rail system of South Africa remain open if these countries are to continue to produce minerals and associated products. A summary of major minerals production and South African shares of the world market are shown in Appendix B. Overall, these figures suggest that the South African position both in terms of reserves and production of minerals and materials essential not only to U.S. defense and commercial production, but also to those interests of Western Europe, Japan and other Western countries, is most substantial at present and will continue to be so in the foreseeable future. Therefore, recent economic and internal political developments have potential for destabilizing minerals and materials markets and, in turn, impacting significantly on the economic and national security status of numerous nations in the West.

Issues of Strategic Concern - In light of the foregoing discussion of concept, the following associated issues were considered by the field study team and explored with knowledgeable South African authorities during the visit:

- -- Economic Environment and Outlook
- -- Current Status and Performance of the Mining and Minerals Processing Industries
- -- Mineral Policy Framework and Business and Government Relationships
- -- Capacity of Infrastructure to Support the Mining Industry
- -- Status of Technological Development in Mining and Materials Processing
- -- External and Internal Threats to Mineral Security
- -- Potential Impact of Economic Sanctions and Internal Investment Limitations
- -- Outlook for Social-Economic Evolution and the Role of Industrial Leadership
- -- South Africa as an Economic Stabilizer for Southern Africa

IV. ACTIVITIES VISITED AND MAJOR FINDINGS

U.S. Embassy, Pretoria - Extensive briefings relating to the current political, economic and national security situations in South Africa were presented by Embassy personnel. Throughout these discussions frank opinions were expressed regarding U.S. interests in South Africa from a long-term point of view. The concept of "constructive engagement" was elaborated in terms of a maximum effort on the part of the country team to have access to all shades of South African public opinion. With respect to the security position of South Africa, the Soviet threat was seen to be focused primarily on gaining influence in the so-called "Front Line States" and thereby isolate South Africa from its neighbors in the long-term future. Soviet designs for acquiring bases for Naval and Air operations would seem to be a likely long-term goal. But aside from currently providing weapons, training and logistical support to cross-border insurgents the direct Soviet role is considered minimal. The main security problem confronting the South African government was seen to stem from internal lawlessness and terrorism activities. The capabilities of police and security forces were considered at this time to be adequate to handle such contingencies.

Department of Mineral and Energy Affairs, Pretoria - This department is responsible for policy studies and analysis and data management and reporting on all aspects of the minerals situation in South Africa. The Chief Director of the Bureau and a senior minerals specialist provided an overview of the structure of the minerals industry, current assessments of minerals endowment, regulatory framework and overall policy architecture for the industry's growth and development. A major theme emphasized throughout these discussions was that while South Africa possesses both the quantity and quality of mineral resources sufficient to make it a leading supplier to the world economy for the foreseeable future, there is *no intention* on the part of current leadership to utilize minerals trade as an economic weapon. The impression conveyed was that South Africa's intention is to continue to operate its minerals enterprise on a private basis, open for foreign investment and non-political in terms of market orientation.

With respect to its minerals technology, these officials expressed confidence that South Africa will continue to be a leader in applying advanced technology and that its record of productivity improvement, safety and efficiency gain is of a world-class caliber. Emphasis on both growth and development in the minerals sector was seen as the best approach for sustaining national economic development with special emphasis on increasing the value-added content of mineral based exports (i.e., ferrochrome, ferromanganese and specialties metals products). Finally, reference was made to linkages of the South African economy and infrastructure with neighboring minerals producing states. The fact that the South African rail system and ports are the major outlets for the mineral exports of these countries and the fact that South Africa provides technical and financial assistance for the maintenance of minerals production of neighboring countries, makes it a base for expanding economic and political stability throughout the region. Data on South African mineral reserves and production are presented in Appendix B.

Visits to Mining Operations, Processing and Research Activities

The team made extensive visits to underground, open pit, processing, smelting and research activities of the following organizations: (a) Rustenburg Mines, Ltd. (subsidiary of Johannesburg Consolidated Investment Co. (JCI); (2) Kloof Gold Mining Company, Ltd. (subsidiary of Gold Fields of South Africa, Ltd.); (3) Middleburg Ferrochrome Plant (subsidiary of Barlow Rand, Ltd.); (4) South African Manganese Corporation (SAMANCOR) (subsidiary of General Mining Union Corporation (GENCOR)); (5) MINTEK (Government Research Laboratory). Also, the corporate headquarters of the mining houses which control the above companies were visited. A brief description of these industrial firms is also presented in Appendix A. In addition, senior executives of each of the parent corporations of the firms listed above held informal discussions with the team at a reception hosted by the U.S. Embassy Regional Resources Officer.

Key Findings - The following is an amalgamation of key findings regarding the status of the South African minerals and materials industries and South African perceptions regarding relations with the U.S. both of which were derived from these first-hand contacts.

Throughout the visit both industrial and governmental leaders expressed the view that South Africa is basically a Western-oriented country, non-communist, and a close friend of the U.S. in spite of recent political and diplomatic developments. As tangible evidence of this, in World War II and in more recent years, South Africa has consistently contributed to the defense of the U.S. and Western Europe. It sees itself greatly misunderstood in today's international environment. The level of development in South Africa in economic, industrial, social and national security terms, makes it a potential leader and stabilizing force for the whole of Southern Africa. The fact that South Africa provides transportation and communication infrastructure for the entire region was emphasized as an illustration of the advantages of economic integration which not only benefits South Africa but also neighboring African states.

The technical and managerial capabilities of mineral company executives were observed to be of high quality. The managerial techniques for planning, financial management, marketing and human resource management displayed are equivalent to those employed in the U.S., Western Europe and elsewhere in the industrialized world. Of special significance was the unexpectedly broad range of opinion expressed by industrial leaders concerning current South African government policies.

The preponderant opinion expressed to the team by the business leaders regarding the political evolution of South Africa was that the nation needs to move faster toward total representation within the government of all societal elements. Frequently the feeling was expressed that a greater involvement of the black population in the economic life of the nation would prove to be beneficial not only in political terms but it would also greatly enlarge the domestic market for South African produced goods and services leading to more rapid growth and development. Most business leaders spoke of the pragmatic necessity for accomplishing these reforms at a rapid pace. But some expressed differences as to the adequacy of the current rate of change.

Specifically, within the mining industry there is great pride regarding the contributions that this industry has made toward black upward mobility; the relatively high pay for black workers; and the quality of working and living condition provided. Recognition of black capacities for training and future supervisory and managerial roles was considered by most mining managers to be both desirable and likely in the near term. Present legal restrictions on the advancement of blacks to such positions represent an obstacle and in addition, the reticence of white-dominated mining trade unions also inhibit this development. The striking diversity of the black labor force engaged in mining was unexpected. Specifically, numerous tribal groups, linguistic differences and the large proportion of migrant workers from outside South Africa complicate the potential for accelerating economic opportunity for blacks. But throughout the mining industry there seems to be a dedication to overcoming these difficulties.

The technical and engineering accomplishments of the South African mining industry are extremely impressive. The extraordinary challenge of deep mining operations in the precious metals sectors (i.e. gold and platinum) is most demanding and has placed South Africa in a state-of-the-art technical leadership position. The engineering talent of the nation is composed of a combination of professionally qualified emigrants and persons trained under unique industry-university cooperative programs. The financial support of the latter is primarily private. As the product of the precious metal enterprises generates a large cash flow it is possible for them to make the heavy investment necessary for the extensive exploitation of these high value resources. In addition, the gold industry has traditionally produced surplus earnings which have allowed for diversification into other marginal mining activities as well as the generation of downstream processing capabilities for enhancing the value added to South African mineral products. This has led in recent years to the development of extensive ferrochrome, ferromanganese, speciality steel and coal mining activities all of which are internationally competitive and growing rapidly.

With respect to South African technological development in mining and processing activities, MINTEK, a specialized government laboratory, provides unique opportunities for business and government cooperation. Specifically, MINTEK provides an institutional setting for cooperative research which can be either proprietary, joint or publicly funded. Most projects relate to improving extraction and processing techniques. Plans have been formed to extend MINTEK's efforts into such areas as market research and econometric studies of the world minerals trade. The research reports and publications provided by MINTEK are widely respected within the international mining and materials communities.

In assessing the current status, capabilities and outlook for the South African mining and processing industries, it is essential that the organizational structure of important segments of these industries be understood. As the South African minerals industry, unlike those in most developing countries, is controlled by private vis-a-vis governmental structures, organizational evolution has been complex. The major mineral deposits, mining facilities and processing plants are typically operated by subsidiaries of larger mining houses. As the products of these operations are often multiple due to the nature of the ores produced and processed, there is

no clear demarcation separating these organizations into neat specialized commodity classifications. A case in point is the production of Platinum Group Metals which consists of palladium, iridium, osmium and other forms. These forms are associated with zinc and copper. Gold production is associated in turn with uranium. Historically, South African minerals production was initially concentrated in the precious metals category and as major firms expanded they entered other lines of minerals and processing activity. This process has generated a structure of related minerals companies with interlocking boards of directors and complex arrangements for finance, marketing and overall management which have some similarity to multiproduct conglomerate companies operating in the U.S. Also, the senior leaders of many of these large holding companies are seen to be industrial statesmen who have direct access to government leaders on a day-to-day basis. Thus, business and government relationships in the mining and processing industries are close and government policies, agendas and programs are extremely supportive of private sector planning for developing South African minerals.

Perhaps the most striking example of industrial influence is represented by the Chamber of Mines where the overall monitoring of public policies is accomplished for industry. The Chamber consists of six mining and finance houses: Anglo-American Corporation; General Mining Union Corporation; Gold Fields of South Africa; JCI; Anglo-Transvaal and Rand Mines. These six firms control approximately 85% of all mineral production in South Africa. This extraordinary degree of concentration, economic power and influence together with the strong supporting role of the mineral agencies of the South African Government has led to a world-class competitive position based on efficiencies in minerals production. Extensive use of tax incentives together with a policy of light-handed regulation has further enabled the large mining houses to prosper. The net effect of these arrangements has produced a confident, optimistic and future orientation on the part of South African minerals executives and government officials alike.

On many occasions private sector executives and managers raised the question regarding perceptions of the South Africans held by opinion-makers in the U.S. Their general concern seemed to be that South Africa is, in fact, misperceived and underestimated in terms of the degree of economic and political development. They felt that in reality the mining and manufacturing sectors offer the greatest economic opportunities for black South Africans but that this reality had not been adequately communicated. Their queries to the team were primarily to determine how U.S. leaders perceive South Africa and if and when the U.S. might impose economic sanctions including the limitation on loans and possible disinvestment by U.S. firms. The team offered the view that the policy of the current U.S. Administration was that it stood opposed to economic sanctions and stood for its stated policy of "constructive engagement". It was explained that the outlook for economic sanctions in the Congress was somewhat less certain. South African business leaders indicated such a prospect would be unfortunate as they value both commercial and other relations with U.S. business partners. It was further stated that it would be possible to replace U.S. involvement with support from Western European and Japanese partners in the future. The basic feeling expressed was that such other partners are more pragmatic and possibly more reliable under current and expected circumstances. One related concern worth note was that expressed by several mining officials that they felt that U.S. equipment and field service and engineering support for U.S.-provided machinery (i.e., Caterpillar) were superior to that available from Japan and elsewhere. Therefore, it was the hope of these individuals that future events would not lead to problems of sourcing of U.S. equipment and support.

V. NATIONAL SECURITY CONTEXT

Within the past several years South Africa seems to have reoriented its national security priorities from its role in a broad global context to the more immediate and pressing challenges emanating from its immediate region and from internal sources of discontent. In many respects discussions with South African business and government leaders give the impression that the nation sees itself in much the same way as Israel in terms of being a beleaguered state with few friends. As a non-communist, progressive and highly developed country within the underdeveloped region of Southern Africa, it feels principally threatened by a combination of domestic instability and cross-border incursions from neighboring states. Consequently, the South African defense programs have become reoriented toward defense of its borders to include extending its national influence into neighboring areas via demonstrated capabilities to repel incursions into its territory. Recent security and economic agreements with neighboring states provide for economic assistance and cooperation in countering the activities of such groups as The African National Congress (ANC). These efforts have resulted in coordinated operations which have been effective in stabilizing the eastern and northern borders. The South African presence in Namibia and operations northward to the Angolan border have also demonstrated the substantial operational capabilities of the South African military. The overall strategy in these cases seems to be both the elimination of tangible threats to South African territory as far forward as possible and simultaneously the building of stabilizing relationships with bordering states where possible.

Internally, South African law enforcement efforts seem to be targeted on reducing the threat to law and order resulting from unrest over apartheid and on countering terrorist activities centered in the urban areas. To date these combined efforts seem to have been effective in protecting key infrastructure supporting transportation, communication and industrial activity. As a result little concern was expressed by minerals industry officials regarding safety and long-term sustainability of mineral production. In addition, the special defense programs that have been initiated to protect rail, power, and port systems have been effective in preventing disruption. Thus, in terms of both territorial defense and internal security the South African Government and its military and law enforcement organizations seem capable of maintaining the security essential for the functioning of minerals and materials processing activities vital to the U.S. and other industrial trading partners.

With respect to the potential threat to the Sea Lanes of Communication (SLOCs) over which minerals flow to these same industrial nations, South African naval and air forces have only limited capabilities for strategic defense. Likewise U.S. and NATO forces available for the defense of the Cape route and South Atlantic/Indian Ocean SLOC's are limited. At the present time Soviet naval forces in the region operating from bases such as those in South Yemen (Aden and Socutra), Ethiopia, Mozambique and Angola do not represent an extensive threat. But should one emerge, the South African military leadership would, in all likelihood reassess its own capabilities for defense of SLOC's and would offer basing and logistical support for Western nations willing to assist. This responsibility appears to be one that should claim not only the attention of U.S. military planners, but more importantly, those of Western European nations and Japan. Due to the substantially greater minerals dependency inherent in the economies of these nations and the associated criticality of South African trade, these nations confront a major strategic challenge should shipping routes become disrupted (See Appendix D). It would seem appropriate that the U.S., Western Europe and Japanese contingency plans should be coordinated with those of South Africa toward the end of securing South Africa's SLOC's.

VI. NET ASSESSMENT

While optimistic concerning the fundamental strength of the South African minerals industry, its technical and managerial competency, and supporting programs of the South Africa Government, the industry's leadership is nonetheless concerned regarding the image of South Africa currently portrayed in the U.S. and other industrialized countries. The growing movement for punitive economic sanctions and possible disinvestment has led to the development of increasing concern and feelings of isolation. As yet this feeling has not manifested itself in overt threats to utilize the substantial dependency on South Africa for strategic and critical materials either as a point of leverage or for economic warfare. Developments such as the rapid decline of the U.S. mining industry limits the number of alternative sources of supply. Together with recent moves to reduce the holdings of the U.S. stockpile of strategic and critical minerals and materials, these developments lead to the reality of growing potential leverage for the South African Government over the U.S. economy. When this new economic reality is viewed in terms of vital U.S. interests, concerns for the continued availability of materials from South Africa inevitably must weigh more heavily in the calculations for U.S. national security. Thus, the current U.S. defense buildup and plans for the achievement of a greater conventional force capability together with improved sustainability and industrial base capacity, are inevitably becoming more intertwined with developments in Southern Africa. Also, the prospects for accomplishing the economic and industrial transition currently underway in the U.S. civil economy, with associated declines in basic industries and advances in higher technology sectors, involve new concerns for Southern Africa as a major mineral producer and material processor nation. The net effect of these security and industrial developments makes it incumbent on the policy community to factor in South Africa's unique contribution to U.S. economic well-being in considering options for political and diplomatic actions. In contrast to the uniquely near independent position of the Soviet Union in terms of external mineral dependency, the U.S. and its allies confront a continuous challenge in managing vulnerabilities of sources of supply. Thus the calculus for determining east-west strategic balances and for formulating security decisions in the future should include the continuous assessment of the interaction of South Africa with the economies of the U.S. and its allies.

VII. RECOMMENDATIONS

As the main purpose of the field study mission was designed to gain first-hand knowledge of the current conditions in South Africa relating to the minerals industry, transport and the overall reliability of minerals and materials supply from the U.S. perspective, it now remains for the interagency community to evolve a comprehensive analytical model for relating the dynamic factors affecting vulnerability with commercial and security interests. Further, the role of South Africa in supplying minerals to the U.S. and its European and Japanese allies must also be assessed on a continuous basis, not only from reported data, but also from discrete first-hand observation. Thus, generalizing from this South African situation, on the supply side there is the need for the development of a methodological approach for assessing vulnerability and dependency patterns affecting the U.S. industrial base under a number of planning scenarios covering the spectrum of likely contingencies over the next five to ten years. Such as effort would trace the flows of minerals and materials from the point of production via distribution channels to the ultimate U.S. and/or allied end user. Such an analysis would provide a basis for the determination of the impact of probable disruptions of supplies, and would provide a refined basis for policy formulation in the interagency community in the areas of: emergency preparedness, industrial mobilization, stockpile requirements estimation and other aspects of national resource allocation planning for contingencies.

On the demand side of the minerals flow, it is essential to gain the current perspective and long-range outlook from private sector. Users of materials and minerals should be surveyed in order to adequately determine potential impacts of supply shortfalls and production limitations related to such contingencies. As it is the charter of the Office of Strategic Resources to stay abreast of minerals and materials conditions from both the supply and demand sides of the market, it is an appropriate extension of current OSR efforts to provide leadership within the interagency community to evolve appropriate methodologies and array programmatic responses to possible mineral and materials needs. Finally, as experience is gained in addressing the immediate problem of South African minerals supply vulnerability from the U.S. perspective, parallel efforts should be undertaken to assess other materials and minerals suppliers in Southern Africa, i.e., Zaire, Zambia and Mozambeaque; in South America, i.e., Brazil, Chile, Bolivia and Venezula and in Southeast Asia i.e. Australia, Malaysia and Indonesia to determine potential consequences of disruption of these sources of supplies. Also assessments of the potential for expanding production and securing access to critical minerals produced in Canada and Mexico should be developed. It is, therefore, recommended that the Department of Commerce endorse a greater interagency effort to draw a comprehensive picture of the U.S. security position in the global minerals and raw materials environment.

Of utmost importance for the near term is the need for the U.S. and its allies in Western Europe and Japan to coordinate strategies and policies to maintain open access and free markets for the following critical materials: manganese, vanadium, chromium, platinum metals, manganese, gold, ferroalloys and cobalt. Disruption of the orderly supply flows and market allocations of these critical materials has the potential for major dislocations not only of the peacetime economies of the major industrial societies of the West but also on vital defense production during periods of preparation or actual wartime.

U.S. DEPENDENCY
on the
REPUBLIC OF SOUTH AFRICA
for
SELECTED NONFUEL MINERALS

* * *

Mineral	South African Percent of 1984 World Mine Production	Percent U.S. Consumption from S.A. (ave. 80-83)	Overall Percent Dependency		
			U.S. (82-84)	E.E.C. (1983)	Japan (1983)
Platinum	42	49	91	100	95
Chromium	27	55	82	92	99
Manganese	11	39	99	99	95
Cobalt	0	61*	95	100	100
Vanadium	30	44	41	100	70

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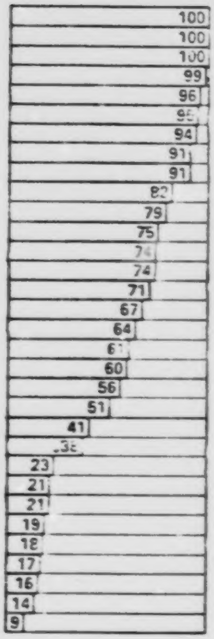
* Percent of U.S. consumption that is transported through the Republic of South Africa.

Source: U.S. Bureau of Mines.

Prepared by: Office of Strategic Resources
U.S. Department of Commerce
May 30, 1985

NET IMPORT RELIANCE: 1984
SELECTED NONFUEL MINERAL MATERIALS

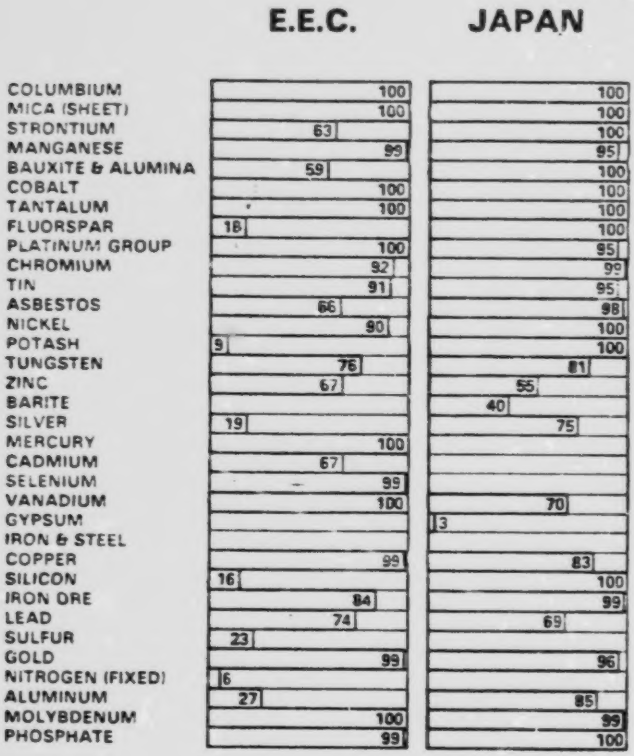
U.S.A.



		MAJOR SOURCES
COLUMBIUM	100	Brazil, Canada, Thailand
MICA (sheet)	100	India, Belgium, France
STRONTIUM	100	Mexico, Spain
MANGANESE	99	So. Africa, France, Gabon, Brazil
BAUXITE & ALUMINA	96	Australia, Jamaica, Guinea, Suriname
COBALT	95	Zaire, Zambia, Canada, Japan
TANTALUM	94	Thailand, Malaysia, Brazil, Canada
FLUORSPAR	91	Mexico, So. Africa, China, Italy
PLATINUM GROUP	91	So. Africa, UK, USSR
CHROMIUM	82	So. Africa, Zimbabwe, USSR, Philippines
TIN	79	Thailand, Malaysia, Indonesia, Bolivia
ASBESTOS	75	Canada, So. Africa
NICKEL	74	Canada, Australia, Norway, Botswana
POTASH	74	Canada, Israel
TUNGSTEN	71	Canada, China, Bolivia
ZINC	67	Canada, Peru, Mexico, Australia
BARITE	64	China, Morocco, Chile, Peru
SILVER	61	Canada, Mexico, Peru, UK
MERCURY	60	Spain, Japan, Mexico, Turkey
CADMIUM	56	Canada, Australia, Mexico, Peru
SELENIUM	51	Canada, UK, Japan, Belg.-Lux.
VANADIUM	41	So. Africa, Canada, Finland
GYPSUM	38	Canada, Mexico, Spain
IRON & STEEL	23	Japan, EEC, Canada
COPPER	21	Chile, Canada, Mexico, Peru
SILICON	21	Canada, Brazil, Norway, Venezuela
IRON ORE	19	Canada, Venezuela, Liberia, Brazil
LEAD	18	Canada, Mexico, Australia, Peru
SULFUR	17	Canada, Mexico
GOLD	16	Canada, Switzerland, Uruguay
NITROGEN (fixed)	14	USSR, Canada, Mexico, Trinidad & Tobago
ALUMINUM	9	Canada, Ghana, Japan, Venezuela

USBuMines

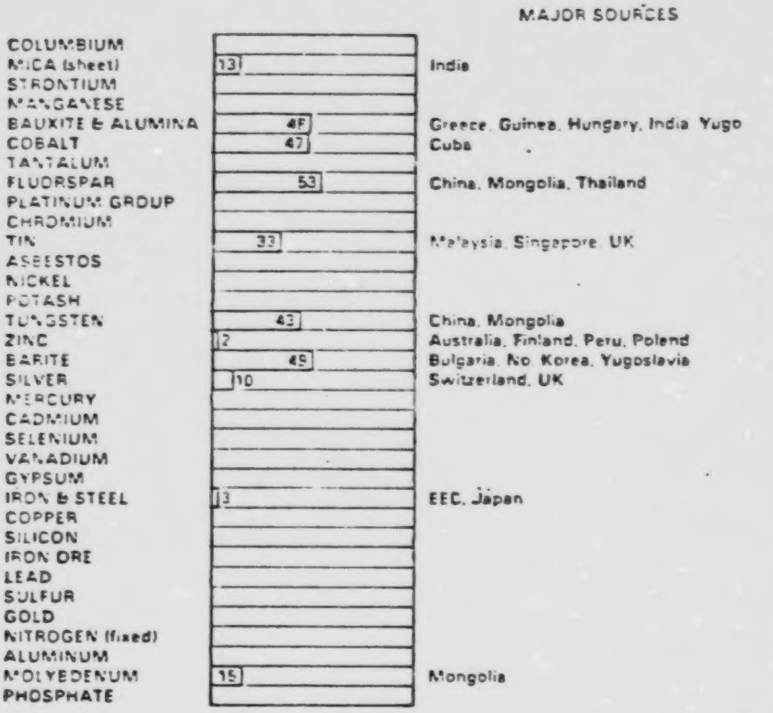
NET IMPORT RELIANCE: 1983
SELECTED NONFUEL MINERAL MATERIALS



USBuMines

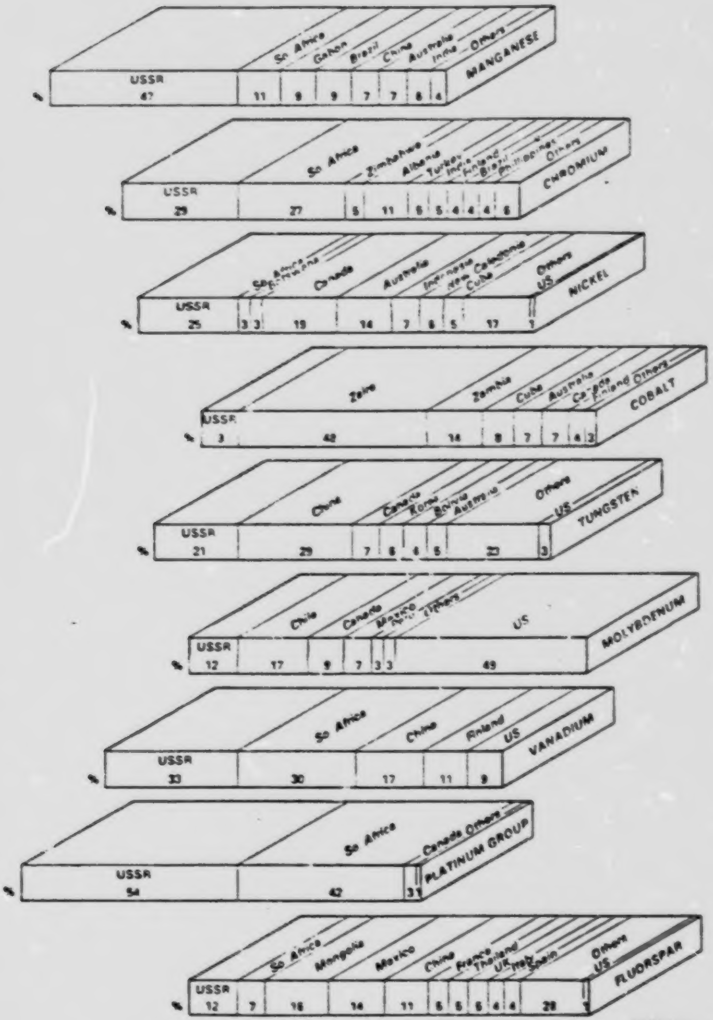
NET IMPORT RELIANCE: 1984
SELECTED NONFUEL MINERAL MATERIALS

U.S.S.R



USBuMines

WORLD MINE PRODUCTION — 1984



USBuMines

Mr. **Brown**. Without objection, it will be made a part of the record.

Mr. **Packard**. Thank you, Mr. Chairman. And then I will read Mr. Lewis, the ranking minority member of this subcommittee, his statement:

> The potential problems facing us because of our dependence on foreign sources for our critical materials are sobering, to say the least. Today we are seeing unrest in South Africa, and this makes this hearing especially timely. However, this issue is larger than the debate over how we deal with today's South African Government. We need only to look at what happened in Iran to realize that we cannot always rely on the present government in power remaining there.
>
> We need to look at ways of reducing our dependence on these foreign countries and devise contingency plans to minimize the impact of a sudden cutoff of critical materials. Certainly we need to ensure that our stockpiles are adequate to see us through until we can develop alternative solutions.
>
> The Office of Technology Assessment has conducted a fairly comprehensive analysis of what some of our options are, and I am pleased to see that they will be testifying today to share some of this information with us. We must critically examine these alternatives to make a realistic assessment of their cost—cost in terms of dollars, jobs, and environment—and other factors affecting the quality of life.
>
> For example, most of the platinum used in the United States today goes into automotive catalytic converters. There are several options available to us if we could no longer get South African platinum, but they all carry a price tag.
>
> Pratt & Whitney uses 1,500 pounds of chromium and 900 pounds of cobalt, nearly all of which comes from South Africa, to build one jet engine for an F-15 or F-16 fighter. Pratt is the major employer in my district, so I have a special interest in seeing how cutting off these materials would be handled.
>
> We need to be concerned over the stability of the countries with whom we trade. However, we also need to be realistic and, above all, we should be consistent with our trading partners. The fact is, we trade with many countries whose internal policies we don't like. Certainly our trade with the Soviet Union in no way signifies our approval of their treatment of Jews or their actions in Afghanistan, and it should be pointed out that nearly all of the chromium that isn't produced in South Africa is produced by the Soviet Union.
>
> So, while it is a laudable goal to free our foreign policymakers from the constraints brought on by our critical materials needs, we should also recognize that our trade policy should not be determined solely on the basis of the internal policies of our trading partners. It is important that we have maximum freedom in dealing with these important issues, and also that we have a clear understanding of what our options are.
>
> The expert witnesses who will be testifying here this morning are certainly well qualified to speak on this subject and I look forward to hearing their testimony.

That's the end of Mr. Lewis' statement. May I just comment for myself that I am extremely interested in this issue. I am very pleased that you have called this hearing and look forward to hearing as much as I can. Unfortunately, I have a markup at 10 in another committee, and so I will be in and out, but I want you to know that I appreciate this hearing and look forward to the witnesses' testimony.

Mr. **Brown**. Thank you, Mr. Packard. I also wish to commend the statement by Mr. Lewis. It's an excellent statement. Mr. Lewis will be here, hopefully, in a few minutes so that he will be able to participate in the hearing process.

Our first witnesses are on deck and ready to go, so I welcome you here. Mr. Wisner, you may begin the morning's session with your statement. Of course, the full text will appear in the record if you care to summarize it in any way.

STATEMENT OF HON. FRANK WISNER, DEPUTY ASSISTANT SECRETARY OF STATE, BUREAU OF AFRICAN AFFAIRS, U.S. DEPARTMENT OF STATE, ACCOMPANIED BY HON. ALLAN WENDT, DEPUTY ASSISTANT SECRETARY OF STATE FOR ENERGY AND RESOURCES POLICY, BUREAU OF ECONOMICS AND BUSINESS AFFAIRS

Mr. **Wisner**. Congressman Brown, good morning, sir. Mr. Packard, good morning. My statement is brief and I will read it and enter it, therefore, into the record.

My name is Frank Wisner. I am the Deputy Assistant Secretary——

Mr. **Brown**. Can you pull the mike up a little bit closer?

Mr. **Packard**. It may not be on.

Mr. **Brown**. That's it. Yes. Good.

Mr. **Wisner**. My name is Frank Wisner, and I am the Deputy Assistant Secretary of State for African Affairs. I am pleased to testify before this hearing of the House Subcommittee on Transportation, Aviation, and Minerals. My colleague from the Bureau of Economic and Business Affairs in the Department of State, Allen Wendt, who is the Deputy Assistant Secretary for Energy and Resources Policy, joins me at this table. The purpose of my brief opening remarks is to give a general overview of U.S. policy in southern Africa.

The United States imports large quantities of strategic materials from South and southern Africa. Our reliance in this respect is one of the several factors we have weighed in calculating our policy toward South and southern Africa. A continuing flow of strategic minerals from the region to the United States and our allies depends heavily on stability in southern Africa. Complete interruption of that flow, a prospect that the Department of State deems unlikely in present circumstances, has the potential of causing disruptions in certain key industries in the western world. My colleagues will testify to the extent of our reliance on imports from South Africa and our level of protection in the event of a cutoff.

Our policy toward the region centers on the need for an end to apartheid in South Africa on the one hand and on negotiations to stem regional violence and bring about Namibia's independence on the other. Only with such change will lasting stability occur in southern Africa, a stability that will bring peace to that region and protect United States and Western interests, including access to minerals, in the long run.

In pursuit of stability and justice, our policy has four principal objectives: an end to apartheid; achieving Namibia's independence and negotiating the withdrawal of Cuban troops from Angola; reducing Soviet influence; and ending the escalating cross-border violence. Our economic and other interests in southern Africa will be best served when the fundamental political problems of the region are resolved.

The Soviet Union pays for and profits from the political violence in southern Africa. The Soviets seek to destabilize the region and to capitalize on the opportunities thus created to expand their influence. But this insidious Soviet policy should not be resisted by siding with apartheid or by taking steps which would exacerbate conflicts in southern Africa. Such an approach would be wrong and would have explosive consequences. The Soviets are destroyers; we are the peacemakers in southern Africa.

U.S. policy tackles both South Africa's internal problems and regional disputes involving several countries of the region. These issues are related. Regional peace depends on a movement away from apartheid, and the reverse is also true. While our influence is limited—southern Africa is half a world away from the United States—our global prestige and ties to all the parties place the United States in a unique position to bring that influence to bear.

Our task is a daunting one. Stability in southern Africa seems remote when one considers recent events inside South Africa, South Africa's raids into neighboring countries, the civil wars in Angola and Mozambique, and the provocative intentions of the Soviet Union. And yet we must remain involved; compromise and reconciliation in this tumultuous region remain possible. These possibilities must be pursued. The States and people of southern Africa need each other. No single State or party can impose its will unilaterally, however unequal the power balance may seem to be. No responsible South African wants to see his country turned into another Lebanon. No one except the Soviets can take comfort from the violence taking place these days.

But unless there is agreement about South Africa's political future between the South African Government and the leaders of that country's black and other communities, instability will persist, the mining industry will be threatened by disruptions, and South Africa's efficient transportation system, which carries mineral exports from points as distant as Zaire, Zambia, Zimbabwe, and Botswana, could be interrupted. South Africa's ports, on which much of the region depends, could also be impeded. Continuing cross-border violence in southern Africa will threaten the peace of the region, its economy and transportation routes.

The implications for our policy are therefore clear: The United States should continue to avoid prescribing blueprints for South Africa's future. That's for South Africans to do. At the same time, we should advocate dialog and negotiations over South Africa's political future. Only if the leaders of South Africa's several communities meet in peace will a stable course be charted for that country.

We should remain builders and not destroyers in that land and in that region, using the influence that derives from being present, having programs and people there, and from having contact and communications with all parties. We should voice clearly, in public and in private, our strong convictions about racism and violence with the strength derived from our own diverse society.

We should develop, rather than withdraw, our influence and be prepared to use it, while taking into account the strength and self-sufficiency of South Africa, a State that cannot be coerced by outsiders on whom it only marginally depends. We should recall that our strongest roles in this situation are moral and political. That being the case, it won't be effective to walk away or sever our contact. We don't intend to do so.

Finally, we should persist in urging all States in the region to resort to negotiations and not to violence to settle their differences.

The United States has charted a responsible course in southern Africa. Our diplomacy seeks to stabilize this region because that is a desirable goal in its own right and because it is in our own interest that the region be stable and contribute to and profit from the international trading system.

Congressman, thank you very much.

[The prepared statement of Mr. Wisner follows:]

TESTIMONY FOR FRANK WISNER
BEFORE
HOUSE COMMITTEE ON SCIENCE & TECHNOLOGY
THURSDAY, OCTOBER 10, 1985

My name is Frank Wisner and I am the Deputy Assistant Secretary of State for Africa. I am pleased to testify before this hearing of the House Subcommittee on Transportation, Aviation and Minerals.

My colleague from the Bureau of Economic and Business Affairs in the Department of State, E. Allan Wendt, who is Deputy Assistant Secretary for Energy and Resources Policy, joins me at this table. The purpose of my brief opening remarks is to give a general overview of U.S. policy in southern Africa.

The United States imports large quantities of strategic minerals from South and southern Africa. Our reliance in this respect is one of several factors that we have weighed in calculating our policy toward South and southern Africa. A continuing flow of strategic minerals from the region to the United States and our allies depends on stability in southern Africa. Complete interruption of that flow, a prospect that the Department of State deems unlikely in present circumstances, has the potential of causing disruptions in certain key industries in the western world. My colleagues will testify on the extent of our reliance on imports from South Africa and our level of protection in the event of a cut-off.

Our policy toward the region centers on the need for an end to apartheid on one hand, and on negotiations to stem regional violence and bring about Namibia's independence on the other. Only with such change will lasting stability occur in southern Africa, a stability that will bring peace to that region and protect U.S. and western interests, including access to minerals, in the long run.

In pursuit of stability and justice, our policy has four principal objectives:

-- an end to apartheid;

-- achieving Namibia's independence and negotiating the withdrawal of Cuban troops from Angola;

-- reducing Soviet influence;

-- ending the escalating cross-border violence.

Our economic and other interests in southern Africa will be best served when the fundamental political problems of the region are resolved.

The Soviets pay for and profit from the political violence in southern Africa. They are seeking to destabilize the region and to capitalize on the opportunities thus created to expand their influence.

But this insidious Soviet policy should not be resisted by siding with apartheid or taking steps that would exacerbate the conflicts in southern Africa. Such an approach would be wrong and would have explosive consequences. The Soviets are the destroyers; we are the peacemakers in southern Africa.

U.S. policy tackles both South Africa's internal problems and regional disputes involving several countries. These issues are related; regional peace depends on movement away from apartheid and the reverse is also true. While our influence is limited - southern Africa is half a world away from the United States - our global prestige and ties to all the parties place the U.S. in a unique position to bring that influence to bear.

Our task is daunting. Stability in southern Africa seems remote when one considers events inside South Africa, South Africa's raids into neighboring countries, the civil wars in Angola and Mozambique and the provocative intentions of the

Soviets. And yet we must remain involved; compromise and reconciliation in this tumultuous region remain possible. They must be pursued. The states and people of southern Africa need each other. No single state or party can impose its will unilaterally, however unequal the power balance seems to be. No responsible South African wants to see his country turned into another Lebanon. No one except the Soviets can take comfort from the violence.

But unless there is agreement about South Africa's political future between the South African Government and the leaders of that country's black and other communities, instability will persist, the mining industry will be threatened by disruptions, and its efficient transportation system, which carries mineral exports from points as distant as Zaire, Zambia, Zimbabwe and Botswana, could be interrupted. Continuing cross border violence in southern Africa will also threaten the peace of the region, its economies and its transport routes.

The implications for our policy are clear:

- The United States should continue to avoid prescribing blueprints for South Africa's future. That is for South Africans to do. At the same time, we should advocate dialogue and negotiations over South Africa's political future. Only if South Africa's leaders of all communities meet in peace will a [illegible]able course be charted for that country.

- We should remain builders and not destroyers in that land and in that region, using the influence that derives from being present, having programs and people there, and from having contact and communication with all parties.

- We should voice clearly, in private and in public, our strong convictions about racism and violence with the strength derived from our own diverse society.

- We should develop, rather than withdraw, our influence and be prepared to use it, while taking into account the strength and self-sufficiency of South Africa, a state that cannot be coerced by outsiders on whom it only marginally depends.

- We should recall that our strongest tools in this situation are moral and political. That being the case, it won't be effective to walk away and sever our contact. We don't intend to do so.

- Finally, we should persist in urging that all states in the region resort to negotiations and not to violence to settle their differences.

The United States has charted a responsible course in southern Africa. Our diplomacy seeks to help stabilize this region because that is in a desirable goal in its own right and because it is our own interest that the region be stable and contribute to and profit from the international trading system..

Mr. BROWN. Thank you, Mr. Wisner.

Do you wish to add anything, Mr. Wendt, to Mr. Wisner's statement?

Mr. WENDT. No, Mr. Chairman. I don't really have anything to add to what Mr. Wisner has said. Thank you.

Mr. BROWN. Thank you.

Mr. Packard, do you have any questions that you would like to ask?

Mr. PACKARD. Thank you, Mr. Chairman.

In your statement, Mr. Wisner, you indicated that you did not consider a complete interruption, or a disruption, or elimination of our trading of particular strategic metals with South Africa, feeling that that would be an unlikely outcome; that more interruptions would be probably the direction that we would see happening. What are our options, recognizing that these interruptions may in fact take place?

Mr. WISNER. Well, I think there are two answers to that question. The first I would recommend, Congressman, you address to my colleagues from the several agencies this morning, who have looked at the broad issue of U.S. minerals dependency, but let me come back to the thrust of the first part of your question, which is, what is the likelihood of disruptions?

We have seen a period of turmoil inside of South Africa. During this period, South Africa has remained a steady producer of the key minerals that we import from that country. There exists a system for labor-management negotiations. Strikes have taken place; strikes have been resolved. For the moment I see no serious impeding of the flow of minerals from the South African economy.

Equally, when you look more broadly at the region, you mentioned in your opening remarks cobalt dependencies. Those productions from Zaire and Zambia, for example, have continued to flow during this period. The transportation systems have continued to function. If anything, those industries are more imperiled not by disruptions due to factors inside of South Africa but rather the economic problems that the industries themselves face, the running down of capital and plant, all issues that I think we need to take seriously as well.

So, very frankly, I just don't see the prospect at the moment of the sorts of interruptions that should lead us to make dramatic shifts in our thinking. Is is, of course, well worth remembering that we have long-term relationships with this market. That market in turn is important to South Africans and southern Africa. It employs black South Africans. It is one of the engines that produces change inside South African society, a functioning minerals industry. On the employment of that industry hang the future prospects of young black South Africans. Much of the region's employment—two-thirds of Lesotho's, 80,000 of Mozambique's workers—find employment in that industry. Those countries are heavily dependent. Therefore, I think we should conduct a responsible trading policy toward South Africa and not entertain notions, if they should emerge in any form, to impede the flow through legislative action of minerals imports into this country from the South African economy.

Mr. PACKARD. This administration has taken the approach of constructive engagement. How is that linked with the strategic metals and our imports of the strategic metals from South Africa? Is there a direct correlation or is it somewhat disassociated?

Mr. WISNER. There is not a direct correlation. The importance of minerals in South Africa is obviously one of the factors we need to take in mind as we work toward stability in the region, but the pursuit of stability in the region stands on its own merits. Without that stability there will be escalating violence, there will be fresh opportunities for Soviet intervention in the area, there will be worsening prospects for the people of the area. The interests of our allies as well as ourselves will be compromised.

Those interests are of a broad nature. They include minerals. They include our strategic interests. They include fundamentally, however, our own basic political interests in stability in a flashpoint on the globe, an area where we can be in tension with the Soviet Union; and they include clearly, as well, the very deep-seated moral feelings that Americans have about racial violence. We are a multiracial society, and the lack of racial harmony in southern Africa and in South Africa has a direct and immediate effect on our own domestic polity.

Mr. PACKARD. So basically the thing that is driving our foreign policy with South Africa is the desire to retain the existing Government in a stable form, more than some of the strategic metal and other export issues?

Mr. WISNER. Mr. Packard, I wouldn't put it quite that way. I wouldn't say that our desire is to retain the Government in its present form; rather, to see South Africans among themselves chart a new course, a new political future for themselves through dialog, through negotiation, that will produce a government that represents the consent of all those who are governed. Our pursuit, therefore, is the goal of stability, of seeing stable, just arrangements worked out for South Africa, one of the consequences of which would be to assure the production of South African minerals, an orderly South African economy.

Mr. PACKARD. What policy should we develop in terms of strategic metals, particularly that we import from South Africa, that might be an alternative to or at least a fallback position on our dependence to South Africa for the bulk of some of these strategic metals, that is, chromium, gold——

Mr. WISNER. Well, I perhaps have a slightly different assessment of the state of risk of the South African supply of the minerals we are talking about than your question seems to apply, but I think the question is more appropriately addressed to my other colleagues from the other agencies who are here today, who have looked at the broad question of what is produced domestically, what can be replaced, what can be imported from other sources, in answering your question specifically.

Mr. PACKARD. The National Security Council recently recommended a significant reduction in the national strategic stockpiling. The stockpiles have been suggested as the most effective means of dealing with supply disruptions from South Africa. Was your office involved in arriving at these recommendations?

Mr. Wisner. The recommendations, if I understand it correctly, are of a broad global nature. The assessments that we have provided deal with the state of South Africa, its economy, its political situation, the region's problems, as opposed to the definition of what works in the American economic system and in our international trading system, a responsibility which appropriately falls to other bureaus in my department, other agencies of the Government.

Mr. Packard. Do you agree and concur with the recommendations?

Mr. Wisner. Congressman, I would prefer those who have been more directly involved in the elaboration of a subject that doesn't impact in that sense directly on our Africa policy. It talks about the broad interests of the United States and our economy, as opposed to our policy toward South Africa.

Mr. Packard. Thank you very much, Mr. Chairman.

Mr. Brown. Mr. Wisner, obviously your office is not responsible for developing materials policy, including the size of the stockpile and so on, but in view of the fact that the political situation in South Africa in the eyes of every analyst does have a major impact upon our critical materials supply, and a cutoff from that source would be extremely unfortunate, it becomes important to know how you go about the process of assessing stability in that region and the probability or lack of probability of a cutoff. We haven't been all that good in assessing when instability would reach a tipping point that would result in supply disruptions in some other areas.

As a general policy that goes far beyond this committee, I think we would be interested in knowing what your assessment is of that acknowledged difficult situation producing a disruption, how you reached that decision, and what degree of confidence you have in it. I don't want you to write a book but just give us a brief answer, if you can.

Mr. Wisner. No, sir, I won't try to write a book.

I think the situation that we see in South Africa at the moment is one that is troubled. It has a lot of emotion in it and it affects us directly. I think we are going to see a certain amount of confrontation and violence. We are going to see a certain amount of government counteraction in the form of repression. I think we are going to see a certain amount of reform in the months and years ahead.

I see at this point no set of factors so dramatic that would lead this committee to conclude that we are faced with a cutoff or a serious interruption of the flow of minerals from the South African economy, or an interruption of the transportation system or port systems that put minerals on the market. I can say that from a careful examination of events in the region; for having served in it myself personally; for having been associated with 10 years of my life. That's our best judgment of what the facts look like, and that's the judgment I would leave with the committee.

Mr. Brown. Is that judgment based upon the rather obvious assumption that any government in that region would want to resume supplying minerals to the market just as quickly as possible?

Mr. Wisner. I think that's an excellent point. The countries in the region of southern Africa, including South Africa itself, are heavily mineral dependent for their export proceeds. Each has a driving interest to maintain a flow of exports, particularly in this time in which many of the mineral exports we are talking about today are entering very depressed market.

Mr. BROWN. Yes; well, of course, we could say the same thing about Iran and Iraq, that they have a very great interest in maintaining the shipment of oil to the world markets, and that doesn't prevent them from slaughtering each other, and for 5 years that supply has been drastically curtailed, so you have to make two kinds of judgments: Is there a possibility of extreme violence breaking out in South Africa, in which the blacks seek to overthrow the established government by force? And, if that does happen, will it end very quickly or will it drag on for 5 years? Those are critical distinctions when we are looking at the U.S. supply of these particularly important strategic minerals. Have you made such a judgment?

Mr. WISNER. Absolutely, Congressman. I don't think I would agree with the direction that your analysis goes in, that South Africa is faced with violence of such magnitude and does not have inherent in itself—and I think it's one of the great dangers of the situation—the force at hand to control further outbreaks of violence, or which in itself produces a cycle of violence which all of us would regret, but that capacity to maintain effective control exists.

Second—and you cite the example of Iran and Iraq—there you have a very volatile region. You have heavily armed states on both sides, two countries that are engaged in a bitter and protracted war. Those military assets do not exist in southern Africa. The capacity to see an Iran-Iraq situation there is simply not present.

Mr. BROWN. We don't see the level of military assets in Central America to lead to a prolonged war, either, and yet somehow or other the level of such military assets seems to build up very quickly under certain circumstances.

Mr. WISNER. Congressman, I take your point, but I think if you look at the policies of the independent states of southern Africa, the black independent states of southern Africa, in their entirety, you will see a determined policy on each of their parts to find rules of détente, of peace with South Africa, rather than seeking to enter into cross-border violence, where they quite clearly are at a serious disadvantage. Therefore, I don't see the kinds of tensions that you would ascribe to—we would jointly ascribe to an Iran-Iraq or even in the Central American context. The region has been going in a different direction for the past several years, I would argue a healthy direction. One shouldn't call it into question.

Mr. BROWN. Well, I hope your analysis is correct and I respect your experience and judgment in the region, but I think even you would not be able to guarantee that your judgment is correct in view of the volatility of such situations.

Mr. WISNER. I fully agree, sir.

Mr. BROWN. Now we have an opportunity here, if we had superhuman wisdom, to attempt to evaluate the conditions in which social arrangements are disrupted by revolutionary forces. It's obviously where for a long period of time there are social, and economic, and other injustices—and we use the term "injustice" in its broadest sense—which appear not to be resolvable by normal incre-

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mental means, and in which the level of psychological tension or whatever you want to call it, the potential that exists in each human being to create a revolution, reaches a flashpoint.

We don't know enough about the psychodynamics of this to be able to analyze it very well, but South Africa is almost a case study in that situation where a large majority of the population are suffering what at least some people perceive to be massive injustice on both a social and an economic basis. They attempt to resolve some of the economic injustice by raising wages, but that doesn't resolve the social injustices.

Do you have anybody over there who tries to make these kinds of theoretical analyses?

Mr. **Wisner**. Oh, indeed, but let me go back for a moment to your starting point, and I will agree with you, and if I have left you a different impression, I have misspoken. Southern Africa and South Africa are very dangerous places. We face a terribly difficult time, and this administration's involvement very deeply in that part of the world is precisely because of the dangers. However, having said that, what I am arguing is that the direction of danger in the region is not of such a dramatic nature as to threaten in the short run our minerals, our capacities to import minerals from that area, short to medium run, as I would see it.

That said, we should be as a responsible government planning carefully for contingencies, setting our long-term plans to take into account factors which we cannot control, and setting our own policy so that we do have ability to control our own events and assure the smooth functioning of our economy. So let me agree that there is danger there. That's what we are trying to address, and yes, it is appropriate to look at policy but I am not suggesting that we need to make dramatic and urgent shifts, given the factors on the ground as they stand to date.

Mr. **Brown**. You indicate you are deeply concerned about the revolutionary prospects there. What has been your effort to analyze the possibility of a major, extended economic stoppage in the way of a strike, or a boycott situation, or something of that sort, which would have the same effect as a violent revolution in terms of disrupting the flow of the materials, but it would not necessarily cause a violent revolution. In other words, have you analyzed the scenario of a prolonged strike or boycott as a factor in interrupting our supply of critical materials?

Mr. **Wisner**. The risk is there. There have been industrial actions in the mining sector. There have not been to speak of in the rail or port areas. Those will continue. They will be a feature of the South African situation, the strike actions in the mining areas, but I think what has impressed me over time is the emergence of a very thoughtful and responsible trade union movement inside of South Africa; a willingness on the part of South Africa's major mining companies to meet at the bargaining table and to hammer out agreements; and the willingness on all sides to bring strike actions to a quick end.

I think I would like to look at something of the positive features in that situation, rather than look to a more dramatic and negative one. I just don't see at this point the sort of prolonged, difficult strike. I don't think it is in the nature of the problem that your question would imply.

Mr. **Brown**. Well, we have you on the record as being very optimistic, and we'll see how history bears you out.

Mr. **Wisner**. Very optimistic I shouldn't be, but cautious——

Mr. **Brown**. Cautiously optimistic.

Mr. **Wisner**. Cautious in terms of predicting the speed with which we should be making dramatic shifts in our policy.

Mr. **Brown**. Mr. Lewis has no questions of you, and that will be sufficient for this morning. We appreciate very much your being here.

Mr. **Wisner**. Congressman, thank you, sir, and Mr. Lewis.

Mr. **Brown**. We certainly hope you're right about your prognostications.

Our next witnesses, and I think we will ask them to come forward as a panel, are Mr. Robert Horton, Director of the Bureau of Mines; Mr. Robert Wilson, Director of the Office of Strategic Resources, Department of Commerce; and Mr. Bernard Maguire, Associate Director for National Preparedness Programs, FEMA.

Now if anybody should know whether we've got problems with critical materials, this distinguished panel should know, shouldn't it? Nod your heads in agreement. [Laughter.]

I notice that you have extensive statements, and while we would never want to constrain you from reading the whole thing, it might be counterproductive if you did so. If you would care to summarize them in some fashion, why, we would appreciate it. Shall we start with Mr. Horton?

STATEMENT OF ROBERT HORTON, DIRECTOR, BUREAU OF MINES, U.S. DEPARTMENT OF THE INTERIOR

Mr. **Horton**. Thank you, Mr. Chairman. My statement is rather extensive, and I will do my best to summarize it, but I would like to——

Mr. **Brown**. Don't miss any of the important parts.

Mr. **Horton**. I'll try not to.

I am pleased to appear before the Subcommittee on Transportation, Aviation, and Materials on the issue of critical materials and South Africa. My testimony will include a discussion of the role of South Africa in the supply of minerals to the United States and its allies, the impacts of potential disruptions in these supplies, and the Bureau's roles and capabilities.

While South Africa is a supplier of numerous minerals to the world markets, my presentation will focus on five metals which tend to receive the greatest amount of attention as being critical for important defense or otherwise strategic reasons. The five metals are chromium, manganese, the platinum-group metals, vanadium, and gold. Although South Africa is not a significant cobalt producer, my remarks will also include this metal because the railroad network of South Africa moves a large portion of the cobalt and other minerals exported from Zaire, Zambia, and Zimbabwe.

For many years, the Republic of South Africa, in many cases along with the Soviet Union, has been a major supplier to world markets of such materials as andalusite, antimony, chromite, ferroalloys, ferromanganese, manganese ores and metals, the platinum-group metals, and others. These two countries, the Republic of South Africa and the Soviet Union, together account for approximately 63 percent of total world chromite production, 46 percent of total world ferrochromium production, 66 percent of total world gold production, 51 percent of total world manganese ore production, 94 percent of total world platinum-group metal production, and 66 percent of the total world vanadium production in 1984. In addition, a major portion of the known ore reserves of gold, chromite, manganese, platinum-group metals, and vanadium are controlled by these two countries.

To assess the importance to the United States, Japan, and Western Europe of the five key metals imported from South Africa, I have highlighted in my written testimony the following: The major end uses of each of the key metals and the extent to which substitution and conservation is possible in the short run; alternative world supply sources for each key metal; the amount of each metal that is available in both Government and private stocks. I would also like to make available to the subcommittee detailed data contained in the relevant Bureau of Mines preprints from the 1985 edition of "Mineral Facts and Problems" which are specific for each of the metals.

Before going further, it is important to recognize that South Africa, even with its internal difficulties, has continued to be a reliable supplier of minerals to the free world. Its large mineral deposits, its modern technology and infrastructure, and its policies of free trade and open investment should weigh considerably against speculation of serious disruptions.

Analysis of the data contained in my testimony on the key materials produced by South Africa, upon which the Western nations and Japan are presently dependent or whose transportation to markets would be directly impacted by a South African minerals supply disruption, indicates that the supply problem for the Western nations and Japan would be acute. The U.S. Government would have to consider several alternatives, including supplementary supplies from the strategic stockpile.

Mr. Chairman, we are preparing the technical analysis in response to the questions raised in your letter of September 24, and we will provide you with copies once it has been completed and reviewed. Mr. Chairman, you stated that the subcommittee would examine various means to minimize this country's dependence on critical materials, and that one area of particular interest is the enhancement of information and data analysis capability as it relates to critical materials. In addition, your letter of invitation expressed interest in a global information system pertaining to critical materials. I believe the Bureau has these capabilities, and I would like to briefly highlight our analytical, informational, research, and development, and emergency capabilities in planning for and dealing with strategic material disruptions.

The analytic system of the Bureau of Mines presently available to analyze potential disruptions to the supply of critical materials consists of three components: World market models, an industry analytic system—an input and output system—and the minerals availability system. The minerals availability system assesses the worldwide availability of nonfuel minerals. The program evaluates, on a worldwide basis, active, developed, and explored mines and deposits and mineral processing plants, and projects a price that the resource from a particular deposit may be made available to the market. Engineering and economic evaluations for the 2,400 most significant domestic and foreign mining and processing operations in the Western World have been completed.

In addition, the Bureau collects information on over 100 mineral commodities from 168 countries. This system encompasses all of the minerals that are of strategic and critical importance to the United States and encompasses all of the countries of the world that produce, consume, and trade these minerals.

In addition to the statistical reports flowing to the Bureau from the domestic industry and from foreign governments, the Bureau's commodity specialists and foreign country specialists—of which there are 85—make frequent visits to the mines and plants related to their commodity or country, acquiring firsthand knowledge of the capabilities, utilization, condition, and modification plans for mines and processing facilities of the major producers worldwide.

The Bureau of Mines research and development activities have addressed domestic minerals supply problems virtually since the Bureau was created in 1910. Today, much of the Bureau's efforts focus on the question of import vulnerability of strategic and critical minerals, including those being addressed here. Enhancing this Nation's ability to rely less on foreign sources of supply is one factor justifying the Bureau's strategic and critical metals research. In addition to those resources for which processing methods have been tested, we have been examining potential sources of strategic minerals in Alaska and on the ocean floor within the U.S. exclusive economic zone.

The Bureau of Mines has the framework needed to discharge its priorities, allocations, and supply expansion responsibilities in the event of a national emergency. The Bureau would also act as the claimant agency for the mineral sector of the economy to assure needed fuel, power, transportation, personnel, supplies, and equipment. In the event of a severe supply disruption, title 1 of the Defense Production Act would be available to assist in meeting any defense priorities. The Bureau of Mines and the Department of Commerce would be involved in implementing such an approach, should it become necessary.

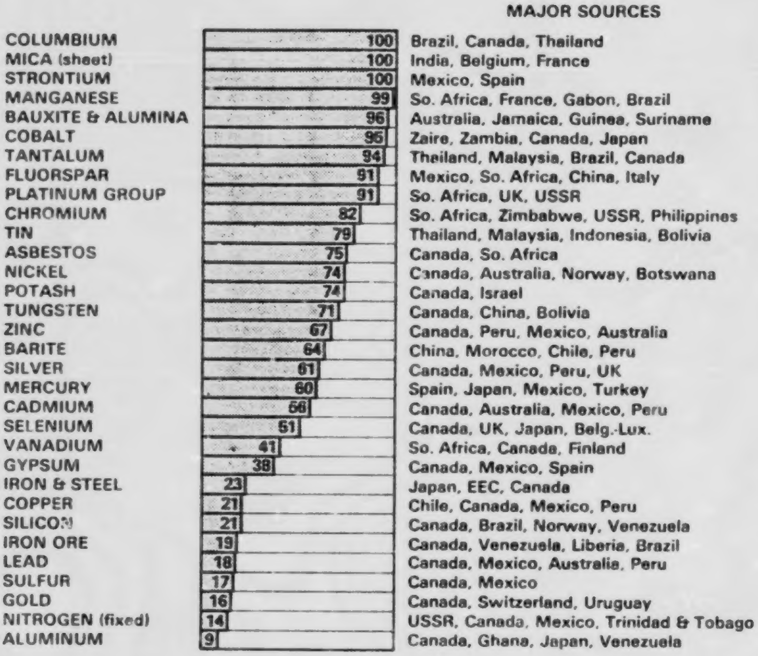
In sum, the Bureau's analytic, information, research, and development, and emergency capabilities to deal with the critical material supply disruptions are considerable. In addition, we are committed to continually enhancing the Bureau's capabilities to meet our responsibilities to assess the impact of international economic, political, and social events on the health of the U.S. mineral industry and economy.

With your permission, Mr. Chairman, I have brought some charts which I think may more ably demonstrate than words some of the issues and problems we are addressing today.

Mr. Brown. We will be glad to see those.

NET IMPORT RELIANCE: 1984
SELECTED NONFUEL MINERAL MATERIALS

U.S.A.



USBuMines

CHART 1

Mr. HORTON. This particular chart (chart 1) demonstrates the net import reliance in 1984 of selected nonfuel mineral materials for the United States of America. I will be showing you these as well as some for the European Economic Community and the Soviet Union. They will be in the same order, so that the general impression you get from this chart will remain.

South Africa, the subject of discussion today, is considerably important in manganese. We import 99 percent of our manganese. It is very important in the platinum group and as regards chromium. While we are dependent on many foreign countries, the list of the foreign countries you see here starts with the largest supplier and goes to the smallest supplier. You will also note that we are relying upon Canada, certainly a friendly neighbor and a good supplier, as well as other friendly nations.

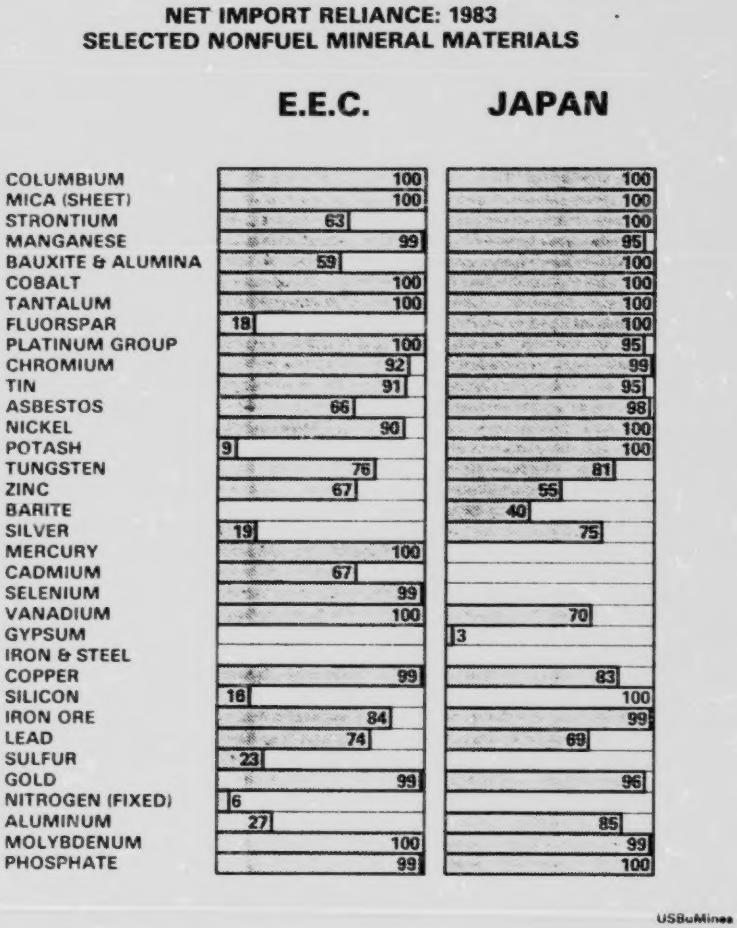

NET IMPORT RELIANCE: 1983
SELECTED NONFUEL MINERAL MATERIALS
E.E.C.
JAPAN
COLUMBIUM 100 100
MICA (SHEET) 100 100
STRONTIUM 63 100
MANGANESE 99 95
BAUXITE & ALUMINA 59 100
COBALT 100 100
TANTALUM 100 100
FLUORSPAR 18 100
PLATINUM GROUP 100 95
CHROMIUM 92 99
TIN 91 95
ASBESTOS 66 98
NICKEL 90 100
POTASH 9 100
TUNGSTEN 76 81
ZINC 67 55
BARITE 40
SILVER 19 75
MERCURY 100
CADMIUM 67
SELENIUM 99
VANADIUM 100 70
GYPSUM 3
IRON & STEEL
COPPER 99 83
SILICON 16 100
IRON ORE 84 99
LEAD 74 69
SULFUR 23
GOLD 99 96
NITROGEN (FIXED) 6
ALUMINUM 27 85
MOLYBDENUM 100 99
PHOSPHATE 99 100
USBuMines

CHART 2

While we are heavily dependent for some of our materials, Japan and the European Economic Community are even more so (chart 2). Japan comes as no surprise. There is very little mining in Japan at all, and within the European Economic Community, while they have some mining, much of their material is imported and they are very heavily dependent. Again, it is the same materials with regard to South Africa for which we have a high dependence.

NET IMPORT RELIANCE: 1984
SELECTED NONFUEL MINERAL MATERIALS

U.S.S.R

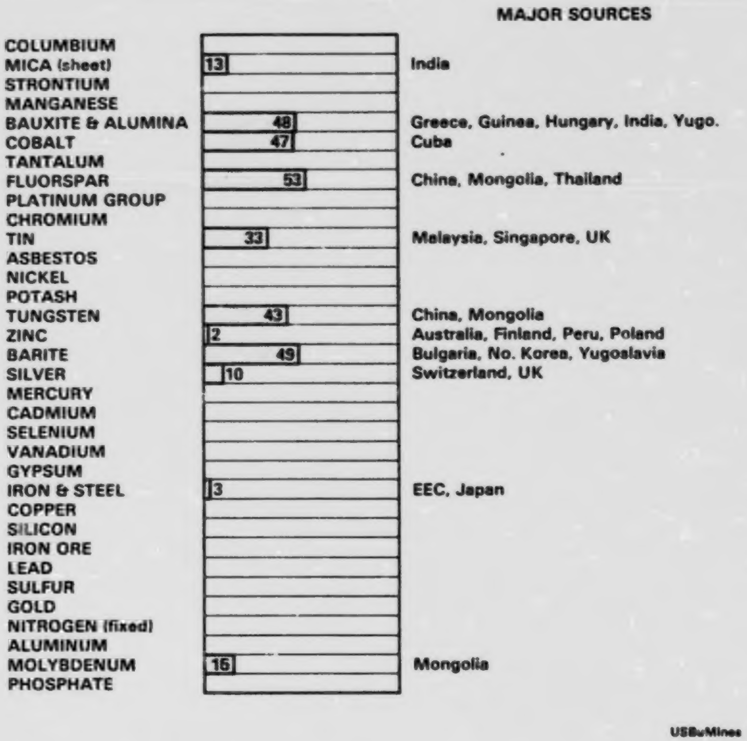


CHART 3

The same is not true of the Soviet Union (chart 3). The Soviet Union is largely self-reliant for its mineral resources. Its very large land area gives it access to many more opportunities for exploration and mining. They do have dependence for bauxite, alumina, cobalt, fluorspar, and there is some indication—although manganese shows blank here—that they may have a dependence for manganese. They have been importing some in recent years.

PRINCIPAL WORLD SUPPLY SOURCES–1984

GOLD

COUNTRY	PRODUCTION (% OF WORLD)	RESERVES (% OF WORLD)
SOUTH AFRICA	47.6	59.4
U.S.S.R.	16.8	15.6
CANADA	5.7	3.3
UNITED STATES	4.5	6.3
CHINA	4.1	N.A.
BRAZIL	3.8	1.8
WORLD TOTAL	46 MILLION TR. OZ.	1,280 MILLION TR. OZ.

TR. OZ. = TROY OUNCES
N.A. = NOT AVAILABLE

SOURCE: U.S. BUREAU OF MINES
OCTOBER, 1985

Chart 4

Turning more specifically, then, to South Africa (chart 4), I mentioned gold, and gold is certainly not considered a normal strategic and critical mineral, but it is strategic and critical certainly in an economic sense, and it is very important to South Africa; 72 percent of the export sales earnings from minerals in South Africa is obtained from gold, and 11 percent from coal. South Africa at present produces 47.6 percent of the world's gold and has almost 60 percent of the gold reserves—a wonderfully endowed country. There are adequate gold reserves in the United States, in Treasury gold and private holdings, and there is substantial production in the United States. It is not a problem to us, but one should not consider minerals in South Africa without paying attention to gold.

PRINCIPAL WORLD SUPPLY SOURCES–1984

PLATINUM GROUP METALS

COUNTRY	PRODUCTION (% OF WORLD)	RESERVES (% OF WORLD)
SOUTH AFRICA	41.1	79.0
U.S.S.R.	52.5	19.0
CANADA	4.9	0.8
WORLD TOTAL	7.05 MILLION TR. OZ.	1,000 MILLION TR. OZ.

VANADIUM

COUNTRY	PRODUCTION (% OF WORLD)	RESERVES (% OF WORLD)
SOUTH AFRICA	35.3	19.8
U.S.S.R.	29.6	60.4
CHINA	14.1	14.0
UNITED STATES	9.3	3.0
WORLD TOTAL	35.4 THOUSAND S.T.	4,800 THOUSAND S.T.

TR. OZ. = TROY OUNCES
S.T. = SHORT TONS

SOURCE: U.S. BUREAU OF MINES
OCTOBER, [illegible]

CHART 5

Turning to those minerals which we do consider to be critical and strategic, this chart (chart 5) demonstrates for platinum and vanadium the principal world supply sources in 1984. South Africa, as regards platinum-group metals, was responsible for more than 41 percent of the world's platinum-group metal production and has 79 percent of the world's platinum-group reserves. In vanadium, they are responsible for 35 percent of the world's production and have almost 20 percent of the world's reserves. Vanadium, fortunately, is a little more equally distributed around the world than is platinum.

While mentioning South Africa on this list, I should call your attention to the second on the list. While South Africa is No. 1 in platinum and vanadium, the Soviet Union is second—in platinum, high in production and lower in reserves; with regards to vanadium, a little lower in production and much higher in reserves.

Mr. Brown. There is a considerable amount of platinum used for jewelry purposes, as is gold, and of course that is a major use of gold and represents, in a sense, sort of an insurance policy for everyone short of gold. Is there anything comparable to that with platinum? Is there a supply of platinum held in private hands, in the form of jewelry or other things of that sort, that——

Mr. Horton. Yes; you will find in my full testimony figures relating to our consumption in the platinum-group metals in jewelry and automobile catalysts. One of the problems, though, is when you're talking of platinum-group metals, one of the group may not necessarily be substituted for another. Palladium will not serve in place of platinum, and vice versa.

Mr. Brown. Yes, yes.

PRINCIPAL WORLD SUPPLY SOURCES–1984

CHROMITE

COUNTRY	PRODUCTION (% OF WORLD)	RESERVES (% OF WORLD)
SOUTH AFRICA	31.6	78.4
U.S.S.R.	31.5	12.2
ALBANIA	9.2	0.6
TURKEY	6.4	0.4
INDIA	4.6	1.3
ZIMBABWE	4.8	1.6
WORLD TOTAL	10.5 MILLION S.T.	1,165 MILLION S.T.

MANGANESE

COUNTRY	PRODUCTION (% OF WORLD)	RESERVES (% OF WORLD)
U.S.S.R.	36.2	36.5
SOUTH AFRICA	14.6	40.7
BRAZIL	11.8	2.1
GABON	11.7	11.0
AUSTRALIA	9.9	7.5
WORLD TOTAL	9.2 MILLION S.T. (Mn CONTENT)	1,000 MILLION S.T. (Mn CONTENT)

S.T. = SHORT TONS

SOURCE: U.S. BUREAU OF MINES
OCTOBER, [illegible]

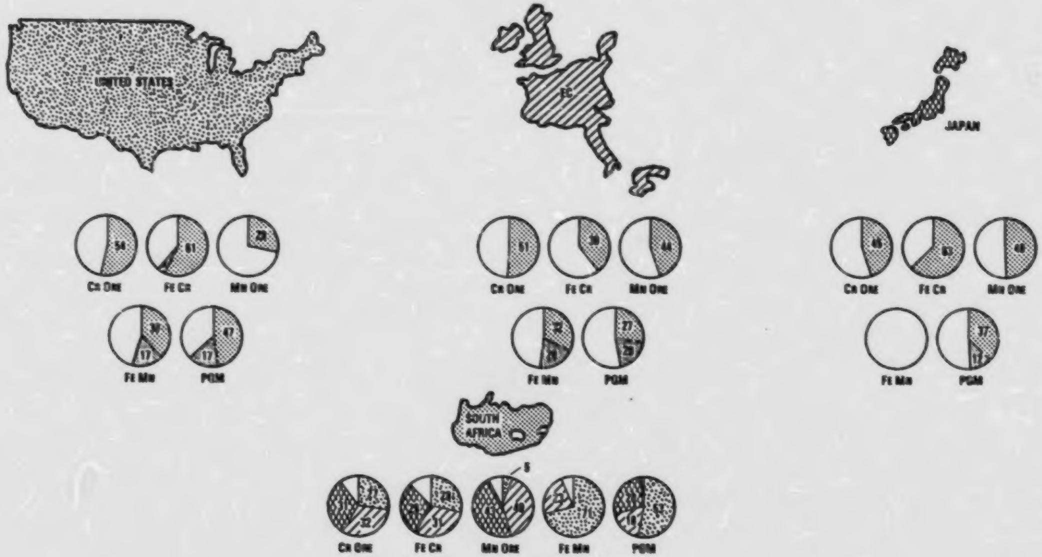
Chart 6

Mr. HORTON. As regards chromite and manganese (chart 6), South Africa and the Soviet Union are almost tied in the production of chromite, 31.5 percent. South Africa, again, is blessed with the world's major reserves, 78.4 percent. The reserves used here are the major reserves. We are not talking resources, that which might speculatively be there. That would not likely change South Africa's position.

The Soviet Union, again, has an almost equal contribution to world production of chromite but much smaller in reserves. The United States currently produces no chromite and does not have any economic reserves at present. The price would have to go up many times for our small mines to be able to operate.

In manganese, the Soviet Union leads in production, 36.2 percent, followed by South Africa at 14.6 percent. The Soviet Union and South Africa have almost the same amount of reserves, 36 and 40 percent. There are substantial productions in Brazil, Gabon, and Australia, as you will note, and moderate reserves.

IMPORTS
(1980-1983)



EXPORTS
(1980-1963)

SOURCE: U.S. BUREAU OF MINES
OCTOBER, [illegible]

Chart 7

The free world's reliance on South African imports and exports is demonstrated by this chart (chart 7). These particular pie charts refer to the amount of materials imported from South Africa. As opposed to total imports for chrome ore, we import 54 percent of our chrome ore from South Africa. We import 61 percent of the ferrochrome, and the small addition shown here in light green and in a pattern on your chart is ferrochrome we import from other countries, but whose source is South Africa. A lot of chrome ore and manganese ore goes to Europe, where it is made into ferrochrome and ferromanganese and transported. Manganese ore is 28 percent; ferromanganese, 38 plus 17 percent, 55 percent on that; and platinum-group metals, 47 percent direct and 17 percent indirect. The same general pattern holds for Western Europe and a similar pattern for Japan.

Mr. **Brown**. Why does not Japan import any—what is the material, ferromanganese?

Mr. **Horton**. Ferromanganese, none of it from South Africa. They are getting it from other sources. Norway is a large producer.

South Africa does import a fair amount of coal from Australia.

The lower chart is color coded, the colors referring to the colors of the countries above, to demonstrate where their exports went. In regard to the United States, 27 percent of their chrome ore came to the United States, 28 percent of their ferrochrome, 5 percent of the manganese ore, 71 percent of the ferromanganese, and 53 percent of the platinum-group metals.

LOCATION AND TRANSPORT OF STRATEGIC MINERALS IN SOUTHERN AFRICA

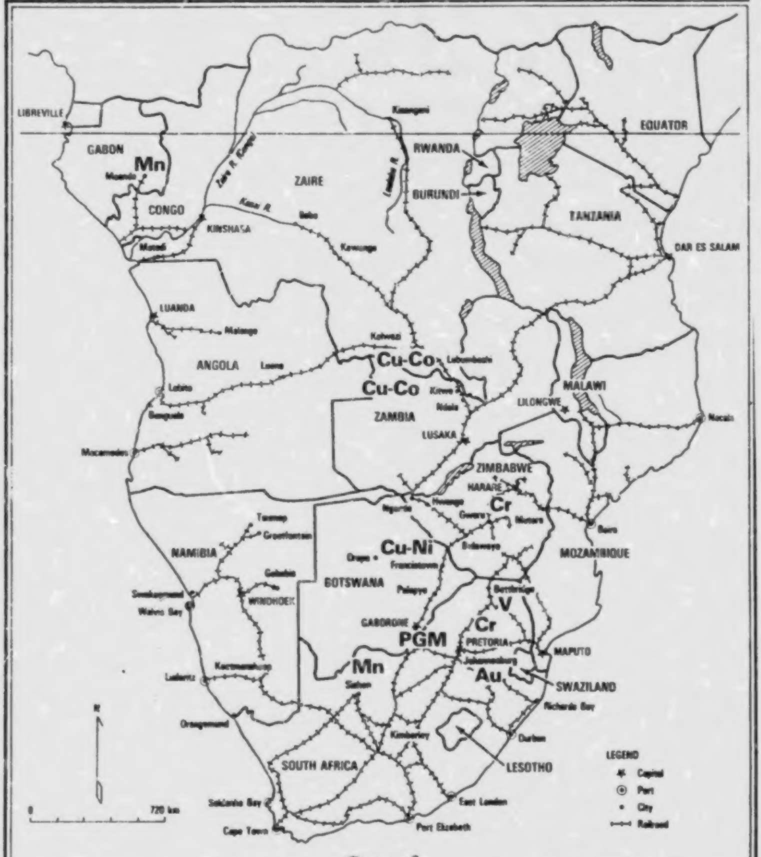

LIBREVILLE
EQUATOR
GABON
Mn
Moanda
CONGO
Matadi
KINSHASA
Zaire R. (Congo)
Kasai R.
ZAIRE
Ilebo
Kananga
Kisangani
Lualaba R.
RWANDA
BURUNDI
TANZANIA
DAR ES SALAM
LUANDA
Malange
ANGOLA
Luena
Lobito
Benguela
Mocamedes
Kolwezi
Cu-Co
Lubumbashi
Cu-Co
Kitwe
Ndola
ZAMBIA
LUSAKA
MALAWI
LILONGWE
Nacala
ZIMBABWE
HARARE
Cr
Hwange
Ngoma
Gweru
Mutare
Beira
MOZAMBIQUE
Bulawayo
Tsumeb
Grootfontein
NAMIBIA
Cu-Ni
Orapa
Francistown
Gobabis
BOTSWANA
Palapye
Swakopmund
Walvis Bay
WINDHOEK
Beitbridge
V
GABORONE
Cr
PGM
PRETORIA
MAPUTO
Johannesburg
Mn
Sishen
Keetmanshoop
Luderitz
Au
SWAZILAND
Richards Bay
Oranjemund
Kimberley
Durban
LESOTHO
SOUTH AFRICA
N
0
720 km
Saldanha Bay
East London
Cape Town
Port Elizabeth
LEGEND
Capital
Port
City
Railroad

CHART 8

SOURCE: U.S. BUREAU OF MINES OCTOBER, 1985

I mentioned cobalt and the importance of South Africa to cobalt, though it produces very little cobalt itself, because of the railroad situation within Africa at the present time. Locating you here a little bit (chart 8), with Zambia, Zimbabwe, Botswana, and Zaire, while some copper and cobalt production from Zaire does exit via the railroad down the river and out to Point Nord for shipment, the greater portion of it comes down through South Africa. Some goes to Dar es Salam, but that port is small and crowded. Additional exports cannot be put out. A large portion of the copper and cobalt from Zaire and Zambia is exported through South African railroads, using South African railroad cars, I might mention, and the same is true of gold. While railroads are available through Mozambique, they are regularly destroyed by revolutionaries, and the same is true for the railroad going through Angola.

In Zaire and Zambia cobalt is a byproduct of the copper production. They have substantial stocks of cobalt which in an emergency could be flown out, but cobalt production could not continue for long in the absence of copper production. They need both to operate economically. They are having a great deal of trouble operating now. They have a shortage of equipment, and fuel, and vehicles, although they miraculously continue to operate.

That concludes my presentation, Mr. Chairman, and I would be pleased to try to answer any questions you might have.

[Letter requesting change in testimony and prepared statement of Mr. Horton follow:]

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

BY SPECIAL MESSENGER

NOV 1 . 1985

Honorable Don Fuqua
Chairman, Committee on
Science and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Enclosed is the transcript of the hearing before the Subcommittee on Transportation, Aviation and Strategic Materials on October 10, 1985, entitled, Implementation of the National Critical Materials Act of 1984: South Africa and Critical Materials.

We have reviewed the transcript and corrected the remarks of the Departmental witness.

It has also come to our attention that one sentence in the written testimony submitted for the record at the time of the hearing is slightly ambiguous, and we would like to replace this page with an amended version. Enclosed is a copy of the new version of page 9 from Director Horton's testimony, in which the last sentence has been clarified.

Sincerely,

J. Stephen Britt
Legislative Counsel

Enclosure

RECEIVED
NOV [illegible]
COMMITTEE ON SCIENCE
AND TECHNOLOGY

Statement of Mr. Robert C. Horton,
Director of the Bureau of Mines,
Department of the Interior
before the
Subcommittee on Transportation, Aviation, and Materials
Committee on Science and Technology
U.S. House of Representatives

October 10, 1985

I am pleased to appear before the Subcommittee on Transportation, Aviation and Materials on the issue of critical materials and South Africa. My testimony will include a discussion of the role of South Africa in the supply of minerals to the United States and its allies, the impacts of potential disruptions in these supplies, and the Bureau's role and capabilities.

While South Africa is a supplier of numerous minerals to the world markets, my presentation will focus on five metals which tend to receive the greatest amount of attention as being critical for important defense or otherwise strategic reasons. The five metals are: chromium, manganese, platinum-group metals, vanadium and gold. Although South Africa is not a significant cobalt producer, my remarks will also include this metal because the railway network of South Africa moves a large portion of the cobalt and other minerals exported from Zaire, Zambia and Zimbabwe.

South Africa as a Supplier of Critical and Strategic Minerals

For many years, the Republic of South Africa, in many cases along with the U.S.S.R., has been a major supplier to world markets of andalusite, antimony, asbestos, chromite, diamonds, ferroalloys including ferrochromium and ferromanganese, gold, manganese ore and metal, platinum-group metals

(PGM's), titanium slag, uranium, vanadium, vermiculite and zirconium. Statistics for 1984 indicate that South Africa produced 48 percent of the total (newly mined) world gold production; approximately 32 percent of total world chromite production; 31 percent of total world ferrochromium production; about 15 percent of total world manganese ore and ferromanganese production; 41.1 percent of total world PGM production; and 35 percent of total world vanadium production. The U.S.S.R. produces similar amounts of these metals. The two countries together accounted for approximately 63 percent of total world chromite production, 46 percent of total world ferrochromium production, 66 percent of total world gold production, 51 percent of total world manganese ore production, 94 percent of total world PGM production and 66 percent of total world vanadium production in 1984.

A major portion of the known ore reserves of gold, chromite, manganese ore, PGM's and vanadium are controlled by these two countries. South African chromite reserves constitute about 78 percent of total world reserves, manganese ore 41 percent, gold 5[illegible] percent, and PGM's approximately 79 percent. Therefore, it is obvious that the loss of this principal source of supply of these metals would be disruptive.

To assess the importance to the United States, Japan, and Western Europe of the five key metals imported from South Africa, it is useful to review the following: 1) the probability of an interruption and whether substantial quantities of key materials exports would be interrupted for extended period of time; 2) the major end uses of each of the key metals and the extent to which substitution and conservation is possible in the short-run and at what cost; 3) alternative world supply sources for each key metal and what it would take in terms of world price and time to bring these sources into production from existing underutilized facilities or through expanded or new facilities; and 4) the amount of each metal that is available in both government and private stocks. I will highlight the other information below in my testimony, and I would also like to make available to the Subcommittee detailed data contained in the relevant Bureau of Mines Preprints from the 1985 Edition of *Mineral Facts and Problems*. I do not plan to address the first point since ~~this is not an area of expertise~~ of the Bureau.

Before going further, it is important to recognize that South Africa, even with its internal difficulties, has continued to be a reliable supplier of minerals to the free world. Its large mineral deposits, its modern technology and infrastructure, and its policies of free trade and open investment should weigh considerably against speculation of serious disruption.

Chromium

Chromium is one of the most important materials in the U.S. economy and in national defense uses because of its wide range of metallurgical, refractory, and chemical uses, especially in stainless steels and alloy steels and superalloys. In 1984, the U.S. consumed approximately 392,000 metric tons of chromium.

Production of chromite ore in the United States, which has always been small, ceased after 1961, except for a small amount produced for export in 1976. Most of the U.S. chromium resources are located in the Stillwater Complex in Montana, in northern California, in Alaska, and in the beach sands of Oregon. Except for the National Defense Stockpile upgrading program, there is no U.S. production of chromium ferroalloys at present.

In 1984, 44 percent of total U.S. chromite consumed was in metallurgical applications, 37 percent in chemical, and 19 percent in refractory end uses. Eighty percent of ferrochromium consumed in the United States was in stainless and heat-resisting steel and 10 percent in full alloy steel.

Based on the 1978 report of the National Materials Advisory Board of the National Academy of Sciences, only 30 percent of domestic chromium consumption could be conserved within five years.

Free world chromite capacity in 1984 was about 3.2 million tons of equivalent metal. Utilization of free world capacity was about 70 percent or about 2.2 million tons. Underutilized chrome capacity in 1984 was equivalent to about 70 percent of South Africa's production that year. Increased capacity utilization in Brazil, Finland, India, the Philippines and Turkey could dampen to some extent a South Africa and Zimbabwe disruption on the economies of the United States, Japan and western Europe.

The Bureau of Mines recently completed a cost evaluation of the availability of world chromium supplies under alternative price levels utilizing the Bureau's Minerals Availability System. The analysis found that for the majority of deposits, sub-economic chromium resources in the United States would require chromium prices 1.5 to 4.5 times current market prices just to cover operating costs. The majority of these resources are located in the Stillwater Complex in Montana and in northern California and Oregon. The development of these resources would require a minimum lead time of 1 to 4 years before production could occur and could only be accomplished within that time period under some form of emergency condition. Production capacity would be small, totaling only 215,000 metric tons by the peak year 1989, assuming development began in 1985. A number of these domestic deposits would be depleted in less than 5 years. Even assuming a sufficient price increase, the uncertainty of the market and the high risk of investment could rule out development without government support.

Other Market Economy Countries' (MEC) resources that could be developed in Canada, Greenland, Australia and Papua New Guinea, are probably sub-economic. In addition, they would require long lead times, subsidization or much higher market prices, and definitely could not offset the chromite loss from South Africa and Zimbabwe. Exports from non-market economy countries, mainly Albania, cannot be expected to add to Western supplies to any degree.

In the event of an emergency, the National Defense Stockpile under recently-announced Presidential decisions contains 795,000 short tons chromium metal equivalent which is four times 1984 total United States imports from South Africa. This level provides a substantial amount of protection for the United States in the unlikely event of an import disruption. Understandably, because of projected increases in U.S. demand between 1984 and the year 2000, at which time demand would be 2.5 times present demand, the protection of the stockpile in the intervening years as it pertains to a South Africa cutoff, steadily decreases.

Gold

Gold, in addition to its intrinsic value, has high electrical and thermal conductivity, malleability, ductility, chemical inertness, and resistance to corrosion, which makes it an important material for use in jewelry, dental, and industrial (mostly electronic) applications. The relatively high price of gold in recent years has encouraged exploration for and development of new gold deposits throughout the world. The United States ranks fourth among world gold producers and contributed 4.5 percent of total world production in 1984. The United States has the third largest reserves, which consist of 80 million troy ounces. The U.S. imports and exports gold but usually has a net import reliance of about 20 percent.

Nearly 53 percent of domestic gold consumption in 1984 was in jewelry and art, and about 33 percent in industrial uses. If necessary, gold usage in jewelry and art and dental applications could be eliminated. The cost of gold currently consumed in industrial uses is usually small in proportion to the total costs of the product. The quantity of gold in highly critical uses (defense hardware and electronics applications) is a fraction of the total consumption.

The increase in gold prices that could result from a rapid and significant interruption in South African production might encourage further worldwide exploration and development of new gold sources.

Vast stocks are held by South Africa, the Soviet Union and by financial institutions throughout the world. Domestically, gold is not a National Defense Stockpile item. In addition to U.S. Treasury stocks, there are several million troy ounces in commercial and private bullion stocks.

The cessation of gold exports by South Africa would not cause any severe problems for the United States or its allies. It would cause serious problems for South Africa because the sale of gold was responsible for 72 percent of South Africa's mineral export sales in 1984.

Manganese

The importance of manganese arises primarily from its desulfurizing, deoxidizing, and alloying functions in iron and steelmaking, which account for about 90 percent of its uses. Steel is a vital component of the U.S. economy and defense activities and there is no practical substitute for manganese in steelmaking. Materials capable of performing the desulfurization and alloying functions of manganese cannot be supplied in sufficient quantities and/or at low prices.

In 1983, almost 52 percent of manganese ore consumed in the United States was used in manganese ferroalloys and metals, 20 percent in pig iron and steel production and 28 percent in battery chemicals and miscellaneous uses. Seventy-eight percent of ferromanganese consumed in the United States in 1984 was in carbon steel production, 9 percent in full-alloy steel and 7 percent in high-strength low-alloy steel.

The Office of Technology Assessment in the report entitled "Strategic Minerals Technologies to Reduce U.S. Import Vulnerability" (1985) estimated that technological progress has the potential of reducing manganese consumption in steelmaking in the long-run by as much as one third within the context of known technology and probable developments.

Manganese resources are concentrated in South Africa, the U.S.S.R., Gabon, Australia and Brazil. Based on a recently completed Bureau of Mines availability study of the development of world manganese ore deposits, U.S. costs for mining domestic deposits would be about five to eight times higher than most of the foreign operations, when both capital and operating costs are considered. Potential U.S. production would probably require at least three years to develop and should be regarded as unfavorable at this time because low-grade domestic resources would require complex and costly beneficiation technology which has not, as yet, been developed.

Potential annual production capacity indicates South Africa produces about 34 percent of free world production. In the event of the loss of South African manganese capacity, most of the other countries would need lead times of three to five years to develop equivalent capacity.

We are told that Australia could double its production from 930,000 short tons in 1 to 1½ years, but market uncertainties would make such investment of considerable risk, if based on a disruption of unknown duration. Gabon has the highest grade manganese ore in the world, but increased capacity must await completion of the Trans-Gabon railroad in the early 1990's. Brazil produces about 20 percent of the free world's production with planned expansions primarily a factor of the availability of capital. India produces about 10 to 12 percent. It is unlikely that India will change capacity significantly, regardless of market conditions. Production from Mexico and Ghana each amounts to about 4 to 5 percent of the free world total and would not likely increase significantly. Present non-producers could contribute about 13 to 15 percent of the total, but this would be at a very high cost.

Imports of free world manganese to East bloc countries over the last 15 years have been steadily increasing as the Soviet Union has been unable to meet their demands. The Soviet Union itself began to import free world manganese three years ago. It is therefore unreasonable to expect their role to increase in the free world manganese market.

Underutilization of the free world's existing manganese production capacity in 1984 amounted to about 38 percent, primarily because of low steel production. About 40 percent of the 3.3 million tons of underutilized capacity is in South Africa, which means that unused capacity elsewhere in the free world is about 1.3 million tons. With projected world demand to catch up with capacity in about 1990, South Africa's capacity should be supplying about 34 percent of free world production by that time.

Domestic industry stocks of manganese ore held at year end 1984 represented about one year's consumption at 1983 rates. Ferromanganese stocks held by the domestic industry would approximate nearly 4 months consumption at the 1984 rate. In the event of an emergency, the National Defense Stockpile under recently-announced Presidential decisions contains 870,000 tons manganese metal equivalent which is 5 times 1984 total United States imports from South Africa. This level provides a substantial amount of protection for the United States in the unlikely event of an import disruption. Understandably, as U.S. and free world demand increases to the year 2000, the role of South African production will also increase.

Platinum Group Metals

The catalytic and electronic applications of the platinum group metals (PGM's) are of critical importance. The reduction of automotive exhaust emissions, the refining of petroleum, and the production of nitric acid for fertilizers, explosives, and other chemicals require platinum-group metal catalysts. Contacts and electrodes for electronic equipment require PGM's to prevent corrosion and wear. Although many potential auto emissions catalyst materials have been examined, only platinum-group metals have demonstrated the necessary efficiency and durability.

In 1984, 43 percent of total PGM consumption was in automotive catalysts, 22 percent in electrical applications, and 15 percent in dental/medical uses. The predominant use of platinum was automotive catalysts (70 percent); palladium use was highest in electrical (31 percent), dental/medical (28 percent), and automotive catalysts (23 percent). Platinum and palladium accounted for 93 percent of PGM usage in 1984.

Platinum and palladium are recovered in the United States as byproducts of copper refining, but production totals only a few thousand troy ounces annually, less than one percent of U.S. demand. Refining of purchased scrap usually accounts for no more than 10 percent of total annual domestic supply. Depending on expected prices, about 25,000 ounces of platinum and 75,000 ounces of palladium could produced per year if the decision is made to proceed with the development of the Stillwater Complex deposit in Montana. Companies that were exploring the Duluth Gabbro in Minnesota have ceased exploration activity. Production of significant amounts of platinum-group metals from the Duluth Gabbro is dependent on copper and nickel output, which in turn would require much higher prices from present depressed prices, an unlikely event. The relative mix of PGM resources in both the Stillwater Complex and Duluth Gabbro is weighted towards palladium over platinum (78 versus 18-20 percent), which does not correspond well to present industrial demand.

In 1984, Canada contributed about 5 percent of total world PGM production. Less than 1 percent of total production was contributed by Australia and Colombia. At present, the total PGM output of countries other than South Africa and the U.S.S.R. could satisfy only about 20 percent of U.S. primary demand.

In 1984, the United States consumed an estimated 2.5 million troy ounces of PGM's of which 10 percent was recovered from recycled material and the balance from imported material and minor domestic production. The United

States is, therefore, almost entirely dependent upon imported PGM's in various forms to meet its domestic needs. It is important to note that, unlike the PGM operations in South Africa which can increase production to meet increased demands, the U.S.S.R., Canada, and other countries produce PGM's as a byproduct primarily from nickel mining. Thus, increased PGM production from these properties is currently dependent on market demand for the primary metal.

Several other nonproducing deposits in Canada (Lac des Illes), Colombia (Choco Pacifico), Brazil (numerous small occurrences) and the United States, were evaluated by the Bureau but they are not anticipated to be in production any time in the near future. In the short-run, none of these deposits could fill a significant portion of a supply gap produced by the elimination of South African PGM exports. With a South African disruption, we should expect some new developments like the Stillwater deposit if there is a price run-up. However, this will depend upon the perceived duration of the disruption.

In summary, there are no known primary PGM sources in market economy countries that could immediately fill the supply gap (based on current demand levels) produced by the loss of U.S. imports from South Africa, nor are there any undeveloped properties that could fill the gap within a short time frame. Excess free world capacity in 1984 other than in South Africa amounted to about 300,000 troy ounces. The Soviet Union has an estimated 300,000 troy ounces of excess capacity. These amounts do not compare with the 1.6 million ounces the U.S. imports from South Africa, much less the demands of other free world users.

Secondary recovery of large quantities of PGM's from automotive catalytic converters is possible but probably unlikely in the short-term. Platinum petroleum-refining catalysts and the PGM catalysts used in nitric acid manufacture are also recyclable.

Domestic industry PGM's stocks approximately the following levels of 1984 domestic consumption: platinum, 6 months; palladium, 5 months; iridium, 2.9 years; osmium, 1 year; rhodium, 7 months; ruthenium, 10 months. In addition to these reported stocks, end users of platinum-group metals also hold sizeable quantities. Considerable stock of platinum, palladium, and iridium in the National Defense Stockpile have been proposed for disposal as being unneeded to meet defense, industrial and essential civilian requirements in the event of an emergency.

Vanadium

The principal use of vanadium is as an alloying element in steel, where it provides various combinations of properties, such as strength, high temperature abrasion resistance, hardenability and toughness. Vanadium is also added to titanium to provide increased strength and workability. Vanadium compounds are also used as catalysts in the chemical industry, especially for the production of sulfuric acid.

In 1984, 79 percent of vanadium consumed in the United States was used in steel. Nineteen percent was consumed in nonferrous alloys. Thus, vanadium is a key component in materials that play significant roles in the U.S. economy and defense.

Colombium, manganese, titanium, chromium, molybdenum, tungsten, or heat treating processes can all substitute for vanadium to some degree, although all have some technical and/or economic drawbacks. Platinum-group metals can substitute for vanadium compounds in some catalytic applications, but they are more costly and more susceptible to poisoning in sulfuric acid production. There is no acceptable substitute for vanadium in titanium alloys. With an average demand growth rate estimated at about 8 percent to the year 2000 because of the shift to increased use of vanadium in steel, demand should amount to 2.5 times that of 1984.

In 1984, U.S. vanadium production constituted approximately 11 percent of world production. Most of the domestic primary vanadium production has been a byproduct of uranium production. It is also recovered domestically as a byproduct of elemental phosphorus production from ferrophosphorus slags and vanadiferous clays. In 1984, domestic producers were operating at about 45 percent of capacity. However, since most U.S. capacity is in domestic uranium mining, which is largely uneconomic at present and projected prices, the 45 percent figure is misleading.

The U.S. in 1984 consumed about one-third of free world's vanadium production when U.S. imports of South African vanadium are excluded. Reduced demand for steel and uranium in recent years has taken its toll on the U.S. vanadium industry, as mining and milling activities have dropped off dramatically. There were 5 companies producing ferrovanadium in the United States at the end of 1984. However, many other countries around the world produce and export ferrovanadium and expansion of world production is possible with considerable price advances. These countries include Canada, Mexico, Brazil, Argentina, much of Western and Eastern Europe, China, India, Japan, and South Africa.

Domestic producer and consumer stocks of vanadium in various forms stood at 3,770 short tons of contained vanadium at the end of 1984, equal to about 8 months of consumption. Nearly 90 percent of the vanadium pentoxide in the National Defense Stockpile may require upgrading prior to use. However, there is no goal for vanadium under the President's stockpile plan.

Cobalt

As stated earlier, South Africa is not a significant cobalt producer. However, South Africa moves a large portion of the mineral production, including cobalt, of Zaire, Zambia and Zimbabwe. South African Transports Services (SATS) moves 45 percent of Zaire's total exports, 40 percent of Zambian exports, and 65 percent of exports from Zimbabwe. SATS is also responsible for airline and harbor transportation. Its management role for the port of Maputo, Mozambique from which Zimbabwean chromite is exported, is declining. Thus, chromite production from Zimbabwe and cobalt production from Zaire and Zambia could be affected by a disruption of South African transport facilities.

Cobalt imparts strength and heat and wear resistance to certain alloys. It is also a strongly magnetic element and displays catalytic activity. As a result, cobalt has a number of important uses including superalloys (jet aircraft engines), wear-resistant alloys, tool steels, cemented carbides (tools, mining and drilling equipment), magnets (rotating machinery, indicating meters, telecommunications, loudspeakers), catalysis (petroleum, chemicals), and paint driers. In 1984, 37 percent of total reported domestic cobalt consumption was in superalloys, 17 percent in magnetic alloys, 10 percent in catalysts, 10 percent in paint driers and 6 percent in cemented carbides.

There are no cobalt reserves in the United States. The last producing domestic cobalt mine shut down in 1971. However, the United States does have two potential cobalt resources, the Blackbird Mine in Idaho and the Madison Mine in Missouri. In 1983, U.S. secondary cobalt production satisfied about 5 percent of reported consumption. It should be noted that dissipation prevents significant cobalt recycling in some end uses, such as chemicals, salts, driers, and magnets. Most secondary cobalt production is derived from recycled cemented carbide and superalloy scrap and from spent catalysts.

According to a 1983 National Academy of Sciences study, essential U.S. cobalt needs were estimated at about 50 percent of total 1983 consumption. Most of the increase in consumption in 1984 over that of 1983 was in the categories which the National Academy identified as essential. The Academy estimated that substitution, recycling, and improvements in design technology are capable of achieving cobalt savings of more than 10 million pounds annually by the next decade. However, this does not take into account the normal increases in consumption that over the same period will raise overall consumption an equivalent amount.

Significant amounts of cobalt in superalloys could be replaced, but this would require costly and time-consuming alloy optimization and engine certification programs. A great deal of substitution for cobalt in magnetic applications has already occurred. But, an estimated 20 percent of current cobalt use in these applications is essential and would continue at even a tenfold price increase. Cobalt is a key requirement for cemented carbides, which are critical to high productivity in metal cutting and forming, mining, oil and gas well drilling, and other industrial operations. Cobalt-free materials cannot be considered as a practical general alternative.

The impact of a disruption in South Africa to world cobalt supply rests with the fact that cobalt from both Zambia and Zaire is dependent on South African transportation (railway, ports) for export shipments. The Benguela railway through Angola has been closed for years because of the civil war in

Angola; shipment through Tanzania is constrained because of congestion at the port of Dar es Salaam and poor railroad conditions. As demonstrated in 1979, cobalt can be flown out of Zaire. Current estimates are that such air shipments could occur at a price premium of as little as 50¢-$1.00 per pound. However, because cobalt is a byproduct of copper production, the inability to ship copper during an extended interruption, and the resulting cessation of copper production, would also result in the cessation of cobalt production. However, stocks of unrefined cobalt in Zaire could replace at least one year of lost mine production. Additional stocks of Zairian cobalt also exist in Belgium.

The principal source of imported cobalt for the United States is Zaire, which provided 46 percent of total imports in 1983 and 1984. (Belgium-Luxembourg contributed an additional 6 percent, which originated in Zaire). Other major suppliers were Zambia, Canada, Norway (Canadian origin) and Finland.

United States industry stocks (consumer and processor) totalled 3.1 million pounds at year end 1984, the equivalent of 2 month's domestic consumption. The inventory of cobalt to be retained in the National Defense Stockpile was 28.6 million pounds or about 1.5 times 1984 imports from Southern Africa.

Results of the Evaluation

Analysis of the preceding data on the key materials produced by South Africa, upon which the Western nations and Japan are presently dependent or whose transportation to markets would be directly effected by a South African mineral supply disruption (chromium from Zimbabwe and cobalt from Zaire and Zambia), indicates that the supply problem for the western nations and Japan would be acute. The U.S. government would have to consider several alternatives, including supplementary supplies from the strategic stockpile.

Mr. Chairman, we are preparing a technical analysis in response to the questions raised in your letter of September 24 and we will provide you with copies once it has been completed and reviewed.

Bureau of Mines Analytic, Information and Research Capabilities in Dealing with Critical and Strategic Mineral Supply Disruptions

Mr. Chairman, you stated that the Subcommittee would examine various means to minimize this country's dependence on critical materials and that one area of particular interest is the enhancement of information and data analysis capability as it relates to critical materials. In addition, your letter of invitation expressed interest in a global information system pertaining to critical materials. I believe the Bureau has these capabilities and would like to briefly highlight our analytic, informational, R&D and emergency capabilities in planning for and dealing with critical and strategic material disruptions.

Analytic Capabilities

The analytic system of the Bureau of Mines, presently available to analyze potential disruptions to the supply of critical materials, consists of three components: world market models, an industry analytic system (input/output), and the Minerals Availability System.

The Bureau has available at this time world market models for particular mineral markets. The world chromium and manganese market models which are being used to develop quantitative impact estimates are partial equilibrium models and consist of supply and demand functions which incorporate historical data on chromium and manganese prices, production and consumption as well as recently collected engineering and survey information concerning likely producer and consumer responses to disruptive conditions. The market model projects world prices, quantities of the mineral consumed by specific users, and the direct economic costs of chromium and manganese supply disruptions. As with all models, these projections may or may not be reasonable because of uncertainty in data limitation.

The interindustry model is an adaptation of the 1977 U.S. Department of Commerce Input/Output Table. Estimated value of output levels of the industrial sectors that comprise the model are a measure of Gross National Product (GNP), the value of output of all U.S. goods and services. Changes in GNP provide a measure of the effect of a disruption and the effectiveness of policy actions. A supplementary measure, computed as a function of change in industrial output, is the change in total U.S. employment resulting from the disruption or policy action. The Bureau of Mines Minerals Availability System assesses the worldwide availability of nonfuel minerals. The program evaluates, on a worldwide basis, active, developed and explored mines and deposits and mineral processing plants and projects a price the resource from a particular deposit may be made available to the market. Engineering and economic evaluations for the 2,400 most significant domestic and foreign mining and processing operations in the western world have been completed.

The Information System

The Bureau collects information on about 100 mineral commodities from 168 countries. This system encompasses all the minerals that are of strategic and critical importance to the United States, and encompasses all of the countries of the world that produce, consume, and trade these minerals.

In the United States, the mineral industry is canvassed directly through monthly, quarterly, and annual questionnaires to ascertain domestic production, consumption, and stocks for mines, smelters, refineries, and plants. Data on foreign trade in mineral commodities, are obtained from the U.S. Bureau of the Census which collects statistics on all U.S. foreign trade.

For foreign countries, mineral information is obtained for the Bureau through U.S. embassies throughout the world. Each embassy has an officer whose responsibilities include reporting on minerals for the Bureau of Mines. At 10 embassies, the U.S. Department of State supports Regional Resource Officers whose sole duty is reporting on the mineral industry of those countries.

In addition to the statistical reports flowing to the Bureau from the domestic industry and from foreign governments, the Bureau's commodity specialists and country specialists, of which there are 85, make frequent visits to the mines and plants related to their commodity or country, acquiring firsthand knowledge of the capabilities, utilization, condition and modification plans for mines and processing facilities of the major producers worldwide.

R&D Activities

The Bureau of Mines R&D activities have addressed domestic minerals supply problems virtually since the Bureau was created in 1910. Today, much of the Bureau's efforts focus on the question of import vulnerability of strategic and critical minerals (SCM), including those being addressed here. Enhancing this Nation's ability to rely less on foreign sources of supply is one factor justifying the Bureau's SCM research. Technological advancements in extractive metallurgy technology, materials, and recycling will help assure against any adverse effects of a supply cutoff. The following comments address some of our current and past effort with respect to the six previously discussed strategic and critical metals.

Our research applied to chromium includes the recovery of the metal from low-grade domestic deposits and recycling from superalloy scrap, speciality steel wastes, and other chromium-containing discarded materials. Some results have been a new series of oxidation-resistant iron-base alloys that require only one-half the chromium contained in conventional stainless steels. Also, two chromium-free alloys have been developed that can be substituted for heat-treated steels used for gears, shafts, and other machine components.

In the case of gold, recent developments have included the electro oxidation of carbonaceous gold ores, carbon-in-pulp technology, agglomeration heap leaching, direct electrowinning, and the recovery from military electronic scrap. These technologies have strong potential for increasing domestic gold production from resources now considered uneconomic.

For manganese, the Bureau is evaluating recent advances in flotation technology for treating low-grade domestic deposits (Three Kids District in Nevada and the Aroostook District in Maine). Research results appear promising, especially concentration using the new column flotation concept. It should be understood that this research is not aimed at making these deposits competitive with large, high-grade offshore deposits, but rather, to have technology available in case of a supply disruption.

Our research concerning the platanium-group metals has been directed toward the possible application of intermetallic compounds as substitutes for platinum catalysts, a major use of the metal. With respect to conservation, technology has been developed for electrodepositing coatings of platinum-group metals onto surfaces of more common, lower-cost metals. This procedure would impart to the base metal all the desired properties needed to withstand corrosive, high-temperature environments, while using only a fraction of the platinum metal otherwise required for solid parts.

Research has been conducted seeking economic methods to recover vanadium from low-grade Idaho mudstones and shales, phosphorite deposits, and Colorado Plateau uraniferous ores. Production from these marginal resources could meet U.S. vanadium needs on an emergency basis.

Like chromium, an adequate supply of cobalt to meet this Nation's needs is reflected in our R&D activities. Our work includes the evaluation of technology for recovering cobalt from southeastern Missouri lead ores in cooperation with a major lead producer. Additionally, technology is being developed to recover cobalt as well as nickel and chromium contained in spent catalysts used to refine and upgrade crude oils and to produce plastics.

In addition to those resources for which processing methods have been tested, we have been examining potential sources of strategic minerals in Alaska and on the ocean floor within the U.S. Exclusive Economic Zone. So far, the chromite deposits we have studied in Alaska have little potential in terms of economic development. In the case of the cobalt-rich manganese crusts near Hawaii and sulfide deposits on Gorda Ridge off Oregon, these deposits represent an important resource, but realistically it will be many years before they will be developed.

Emergency Power Capabilities

The Bureau of Mines has the framework needed to discharge its priorities, allocations, and supply expansion responsibilities in the event of a national emergency. The Bureau would also act as the claimant agency for the mineral sector of the economy to assure needed fuel, power, transportation, personnel, supplies, and equipment. To facilitate coordinated government action in the event of an emergency, the Bureau in 1975 organized nearly 100 interagency mineral commodity committees. These committees would be promptly called upon in the event of any emergency.

In the event of a severe supply disruption, Title I of the Defense Production Act, would be available to assist in meeting any defense priorities. The Bureau of Mines and the Department of Commerce would be involved in implementing such an approach should it become necessary.

At some point in a serious shortage situation involving National defense, recourse to the strategic stockpile might be required. To release stockpiled materials, FEMA, in consultation with other agencies including the Bureau of Mines, would prepare a justification and recommendation for the President's signature. On receipt of the President's authorization, the Office of Stockpile Disposal of GSA would release the material to specified recipients.

If the supply disruption were long-lasting, it might be necessary to use supply expansion programs under Title III of the Defense Production Act. These could cover domestic deposits and reliable foreign sources. The Bureau of Mines would recommend needed mineral supply expansion programs.

In sum, the Bureau's analytic, information, R&D, and emergency capabilities to deal with the critical material supply disruptions are considerable. In addition, we are committed to continually enhancing the Bureau's capabilities to meet our responsibilities to assess the impact of international economic, political and social events on the health of the U.S. mineral industry and economy.

Mr. Chairman, this concludes my statement, and I would be pleased to answer any questions which you and Members of the Subcommittee may have.

Mr. BROWN. Thank you, Mr. Horton. It's very illuminating. I would like to go ahead with Mr. Wilson and Mr. Maguire before we ask you to respond to questions.

Mr. Wilson.

STATEMENT OF ROBERT D. WILSON, DIRECTOR, OFFICE OF STRATEGIC SERVICES, U.S. DEPARTMENT OF COMMERCE

Mr. WILSON. Mr. Chairman, members of the subcommittee, staff, my name is Robert Wilson. I am the Director of the Office of Strategic Resources, U.S. Department of Commerce. I am pleased to have the opportunity to testify before this committee. I have noticed in Mr. Horton's testimony that a considerable part of my testimony has been included in his. Therefore, I will submit my testimony for the record and briefly summarize to save you time.

Mr. BROWN. That would be fine.

Mr. WILSON. Thank you.

As you know, our Nation is endowed with a wealth of natural resources on which our industrial strength is based. Our industrial strength is an essential element in our vast economy as well as our national security. Although we are a resource-rich nation, there are a number of mineral commodities that are important to our industry but that we do not produce here in significant quantities. Of the more than 90 known mineral commodities, we are more than 40 percent on imports to supply our domestic needs for at least 34 minerals, and we are more than 90 percent import dependent for at least 16 mineral commodities.

This dependence on foreign sources of supply leaves us vulnerable to a disruption in access to mineral supply which could have adverse effects on our economy and national security. Let me add that vulnerability is determined, however, by several factors: The potential severity of a possible interruption; whether other supplies exist worldwide; availability of private sector and Government-held stocks; whether other materials can be substituted; and whether opportunities exist for increased efficiency in the use of the material.

Some of the mineral commodities that we are talking about today play a crucial role in our civilian and defense industrial base.

They are used in auto and truck production, housing construction, weapons systems, jet aircraft, ammunition, communications equipment, and petroleum refining. For this reason, national security considerations demand that we as a nation assure a supply of these minerals to our domestic industry.

Our good trading relationships with foreign producers of these minerals assure us of a continuing supply during times of peace. However, these materials must travel over long trade routes and they come from parts of the world that might be targets of opportunity for our enemies during times of war. While the administration has determined that most of our overseas suppliers are reliable, in the long run we cannot guarantee they will remain free from a supply disruption. Steep price rises resulting from such a disruption may make these commodities further unavailable to the civilian economy during times of war. History has taught us that both of these types of disruptions can be real threats.

Mr. Horton has talked about several of the specific minerals and materials from South Africa, and I won't go over all of those figures but I do think it's significant to point out the overall import dependency of the United States on five of these minerals. For platinum, we import 91 percent of our total requirements; for chromium, 82 percent. Manganese, 99 percent of our total demand must be satisfied from sources off our shores. For cobalt, the import dependency is 95 percent, and for vanadium it is 41 percent.

When we talk about these minerals, it is important to realize the uses. All of you have worked on mineral issues for quite some time, and you know it's a difficult issue for most people to understand simply because the commodity loses its identity during the production process. Chromium is important and enjoys a diversity of uses because of its properties of hardenability, strength, resistance to corrosion, oxidation, and wear. It is used to produce stainless, full-alloy, and high-strength low-alloy steels, high-purity ferrochromium, and electrolytic chromium steel. These materials in turn are used in the production of tanks, ships, military hospital equipment, military aircraft, naval nuclear-propulsion systems, B-1B landing gear, and many other types of industrial equipment.

Cobalt imparts the properties of increased heat resistance, wear resistance, strength, and magnetization to other materials. It is used in the production of superalloys, mainly for industrial and aircraft gas turbine engines; in magnetic materials for various electrical applications; and in paints and ceramics as decolorizers, dryers, pigments, and oxidizers. Cobalt is also used in cemented carbides, containing 10 to 15 percent cobalt, which are used in the manufacture of cutting tools.

Manganese is used as a desulfurizer, deoxidizer, and conditioner in the production of all types of steel. In addition to these functions, it is used in the form of ferromanganese and imparts the properties of strength and hardness to steels. Steel, of course, is used in a multitude of applications, including ships, tanks, other military vehicles, buildings, and bridges.

The platinum-group metals include platinum, palladium, rhodium, ruthenium, iridium, and osmium. These metals are chemically inert over wide temperature ranges, have high melting points, and possess a high degree of catalytic activity. They are used as catalysts in automotive exhaust systems, in petroleum distillation, in chemicals and pharmaceuticals, and fertilizer products. Electrical and electronic applications of platinum-group metals include relays, voltage regulators, thermostats, electron tubes, printed circuits, resistors, and high-strength magnets.

The most useful properties of vanadium are heat, shock, and wear resistance, and it is essential in the making of steel.

Suitable substitutes do not exist for a number of these metals in most applications. For some, substitutes are available, but only with a reduction in product performance and an increase in cost. No known replacement exists for new chromium in stainless steel, and without manganese you cannot make steel. Even in minor applications for most of these metals, the substitution of these metals is impossible. Platinum-group metals can substitute for one another.

At that point I would like to, because I think the rest of it has been covered by Mr. Horton, go to some of the world reserve figures that I think are important for the rest of my testimony. I think it is important to note, in terms of known world reserves of these minerals, that South Africa and the Soviet Union combined have 97.5 percent of the world's known reserves of platinum. For chromium, South Africa and the Soviet Union have about 86 percent of the known world reserves. For manganese, the Soviet Union and South Africa together have 91.6 percent of the world reserves.

Now, cobalt is not important because it comes from South Africa directly but most, 61 percent of the cobalt that we use in this country, comes through the South African transportation system. In terms of world reserves of vanadium, 71.8 percent of the total known world reserves are either in South Africa or the Soviet Union.

Those facts make it important to realize that South Africa is an important ally in the sense of supplying us metals. It is important to point out—a lot of the work I have been doing on this lately—that we have received absolutely no indications that the South Africans would use metals or minerals as a reverse sanction against the United States. We think that shows two things: No. 1, the success of our policy of constructive engagement and, No. 2, the role and value of mineral commodities to South Africa. We have been asking in the last few months—and I don't think I am addressing the members of this committee—but in the current debate on South Africa that this issue particularly needs to be given more consideration in the public debate.

Because of the large amounts of these five minerals that the United States imports from or through South Africa and their limited alternative sources, a peacetime cutoff of supply from that country could result in significant to substantial short-term price increases for our domestic industries. It can be stated that, in the least, the role of South Africa in supplying minerals to the United States, and to our European, and Japanese allies must be assessed on a continuous basis.

Thank you.

[The prepared statement of Mr. Wilson follows:]

TESTIMONY OF ROBERT DALE WILSON

DIRECTOR, OFFICE OF STRATEGIC RESOURCES

U.S. DEPARTMENT OF COMMERCE

BEFORE THE

SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS

OF THE

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE AND TECHNOLOGY

OCTOBER 10, 1985

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

My name is Robert Dale Wilson and I am the Director of the Office of Strategic Resources, U.S. Department of Commerce. I am pleased to have the opportunity to testify before this hearing of the House Subcommittee on Transportation, Aviation and Materials. As Director of the Office of Strategic Resources, I am responsible for coordinating the interagency activities of the Department of Commerce that directly affect not only U.S. minerals producers, but also those industries that are users of mineral raw materials. Carrying out this duty requires an understanding of numerous complex issues, the most important of which is the role of minerals in the U.S. economy.

Our Nation is endowed with a wealth of natural resources, on which our industrial strength is based. Our industrial strength is an essential element in our vast economy as well as our national security. Although we are a resource-rich nation, there are a number of mineral commodities that are important to our industry but that we do not produce here. Of the more than 90 known mineral commodities, we are more than 40 percent dependent on imports to supply our domestic needs for at least 34; we are more than 90 percent import dependent for at least 16 mineral commodities.

This dependence on foreign sources of supply leaves us vulnerable to a disruption in access to mineral supplies, which could have adverse effects on our economy and national security. Some of these mineral commodities play a crucial role in our civilian and defense industrial base. They are used in auto and truck production, housing construction, weapons systems, jet aircraft, ammunition, and communications equipment. For this reason, national security considerations demand that we, as a nation, assure a supply of these minerals to domestic industry.

Our good trading relationships with foreign producers of these minerals assure us of a continuing supply during times of peace. However, these materials must travel over long trade routes and they come from parts of the world that might be targets of opportunity for our enemies during times of war. While the Administration has determined that most of our overseas suppliers are reliable, in the long run we cannot guarantee that they will remain free from a supply disruption. Steep price rises resulting from such a disruption may make these commodities further unavailable to the civilian economy during times of war. History has taught us that both of these types of disruption can be real threats.

Shortages of materials critical to the war effort were experienced in World Wars I and II and in the Korean War. Each of these conflicts was followed by major legislation addressing the need to avert shortages of raw materials during wartime. The Strategic Materials Act of 1939, the Strategic and Critical Materials Stock Piling Act of 1946 and the Defense Production Act of 1950 were all intended to improve the readiness of the Nation's industrial base by assuring the supply of the necessary materials and to prepare for national defense mobilization should it be required. These acts marked the emergence of a national materials policy and to this day have served us well in providing protection in the event of a future conflict.

The report of the President's Materials Policy Commission, created by President Truman in 1951, was the first major work to acknowledge the changing status of the United States with regard to raw materials supplies. The report, entitled Resources For Freedom, noted our transition from a raw materials surplus nation to a raw materials deficit nation. This trend has continued and has become even more pronounced in the present. The strategic nature of mineral commodities has been recognized in various laws and Presidential policy pronouncements since that time, all of which by divers means recommended strong action that should be taken to assure an adequate supply of materials necessary to maintain our well-being. It must also be understood that certain laws have been passed, such as environmental standards, that increase the cost of producing materials and have an adverse effect on the competitiveness of domestic producers. Such laws are often unavoidable, but in the least their effects should always be recognized.

Like the United States, the Republic of South Africa is endowed with a wealth of natural resources. It possesses reserves of a number of minerals for which the United States is import dependent. South

Africa accounts for 81 percent of the world's platinum reserve base*, 71 percent of the world's manganese reserve base, 55 percent of the world's gold reserve base, 47 percent of the world's vanadium reserve base, 84 percent of the world's shipping grade chromium reserve base, 17 percent of the world's fluorspar reserve base, and 15 percent of the world's ilmenite reserve base. In 1984, South Africa accounted for 42 percent of the world's platinum production, 30 percent of vanadium production, 27 percent of chromium production, 49 percent of gold production, 11 percent of manganese production, 7 percent of fluorspar production, and 10 percent of ilmenite production.

South Africa's position as a minerals supplier is further enhanced by its location on the coast of Africa. Land-locked nations such as Zimbabwe and Zambia transport a significant portion of their mineral exports on South Africa's rail lines and through its ports. South African railways are a major means of transport for Zimbabwe's chromium and Zambia's cobalt, both of great importance to U.S. industry. Furthermore, imports of petroleum products, machinery and spare parts vital to the mineral industries of these countries travel through South Africa to other African countries.

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* Reserve Base--That part of an identified resource that meets specified minimum physical and chemical criteria related to current mining and production practices, including those resources that are currently economic, marginally economic, and some that are currently subeconomic.

The United States considers a number of these minerals strategic and critical, that is, they are 1) needed to meet U.S. requirements in the event of a national emergency, and 2) are not found or produced in the United States in sufficient quantities under current market conditions to meet such needs. Of specific importance with regard to South Africa are platinum, chromium, vanadium, manganese, and cobalt. From South Africa, the United States currently obtains the following percentages of its imports: chromium, 55 percent; platinum, 49 percent; vanadium, 44 percent; manganese ore, 31 percent; and ferromanganese, 39 percent. Total U.S. import dependence in 1984 was 82 percent for chromium, 91 percent for platinum, 41 percent for vanadium, and 99 percent for manganese. In addition, 61 percent of the total cobalt that the U.S. consumes is transported through South African ports (U.S. import dependence for cobalt was 95 percent in 1984).

These five commodities are also important to the economies of our allies. The European Community (EC) and Japan are even more dependent on foreign sources for chromium, cobalt, manganese, platinum, and vanadium than is the United States. EC net import reliance for chromium is 92 percent; for platinum, 100 percent; for cobalt, 100 percent; for manganese, 99 percent; and for vanadium, 100 percent. Japan's net import reliance amounts to 99 percent for chromium, 95 percent for platinum, 100 percent for cobalt, 95 percent for manganese, and 70 percent for vanadium. By contrast, the Soviet Union is reliant on imports of mineral raw materials to a much lesser degree. The USSR is more than 30 percent reliant on imports of only six mineral commodities--fluorspar (53 percent), barite (49 percent), bauxite and alumina (48 percent), cobalt (47 percent), tungsten (43 percent), and tin (33 percent). Cobalt, chromium, manganese, vanadium, and platinum are all vitally important to a number of U.S. industries. Without these minerals, production of numerous manufactured goods important to our national defense and industrial well-being would be disrupted.

Two essential points that must be kept in mind as we discuss U.S. dependence on South African material supplies are as follows: one, it is not the U.S policy to be in a position of reliance on these minerals during a period of national emergency or military conflict. To provide a means to prevent such a situation the President has adopted a stockpile plan to maintain a non-fuel materials stockpile, and; two, this stockpile contains over a year's consumption of selected materials, some of which we import from South Africa in significant quantities. The President believes this stockpile provides substantial protection to the U.S. in the event of a severe interruption and serves as a disincentive to anyone that may be contemplating a disruption of such materials.

Chromium enjoys a diversity of uses because of its properties of hardenability, strength, and resistance to corrosion, oxidation, and wear. It is used to produce stainless, full-alloy, and high-strength low-alloy steels, high-purity ferrochromium, and electrolytic chromium metal. These materials in turn are used in the production of tanks, ships, military hospital equipment, military aircraft, naval nuclear-propulsion systems, B-1B landing gear, and other industrial equipment. Chromium is also used extensively in the chemical industry to produce pigments for paints, inks, and roofing granules.

Cobalt imparts the properties of increased heat resistance, wear resistance, strength, and magnetization to other materials. It is used in the production of superalloys, mainly for industrial and aircraft gas turbine engines, in magnetic materials for various electrical applications, and in paints and ceramics as decolorizers, dryers, pigments, and oxidizers. Cobalt is also used in cemented carbides, containing 10 to 15 percent cobalt, which are used in the manufacture of cutting tools and in bits for mining and drilling. Organic cobalt compounds are used by the rubber industry in steel belted radial tires.

Manganese is used as a desulfurizer, deoxidizer, and conditioner in the production of all types of steel. In addition to these functions, manganese in the form of ferromanganese or silicomanganese imparts the properties of strength and hardness to steels. Steel, of course, is used in a multitude of applications including ships, tanks, and other military vehicles, buildings, and bridges.

The platinum group metals include platinum, palladium, rhodium, ruthenium, iridium, and osmium. These metals are chemically inert over wide temperature ranges, have high melting points, and possess a high degree of catalytic activity. They are used as catalysts in automotive exhaust systems, in petroleum distillation, in chemicals and pharmaceuticals, and in fertilizer production. Electrical and electronic applications of platinum group metals include relays, voltage regulators, thermostats, electron tubes, printed circuits, resistors, and high-strength magnets.

The most useful properties of vanadium are heat, shock, and wear resistance. These properties make vanadium particularly attractive to the steel industry, which uses vanadium in high-speed tool steels, high-strength low-alloy steel, and full-alloy steel. Such alloys are used in the automotive industry for crankshafts, pinions, and gears, hood and door panels, wheel discs, and suspension arms. Vanadium is also used in the production of titanium alloys and as a catalyst in chemical processes.

Suitable substitutes do not exist for these metals in a number of their uses. For some, substitutes are available, but only with a reduction in product performance or an increase in cost. No known replacement exists for new chromium in stainless steel, with the exception of chromium stainless steel scrap. While other materials can substitute for stainless steel in non-essential applications, this would not apply to the vast majority of uses of such steel.

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Higher cost, lower performance substitutes for chromium in alloy steels include nickel, cobalt, columbium, vanadium, and molybdenum. There are no substitutes for chromium in superalloys however.

Nickel-based alloys can be substituted for cobalt alloys in some applications, and columbium and tantalum alloys can sometimes substitute for cobalt superalloys. Substitutes for cobalt catalysts are generally not as effective but include manganese, lead, nickel, and tungsten. Potential substitutes in specific products are nickel and ceramics in jet engines; nickel, platinum, barium and strontium ferrite, and iron in magnets; molybdenum carbide, ceramics, and nickel in machinery; and copper, chromium, and manganese in paints.

In the production of iron and steel, nothing can satisfactorily substitute for manganese. Even in minor applications, substitution for manganese rarely is possible.

Although platinum group metals can substitute for one another, substitution by other metals usually implies cost or performance penalties. For electronic uses, tungsten, nickel, silver, gold, and silicon carbide may be substituted. Less efficient substitutes for platinum group metals in catalysts include rare earth elements, nickel, molybdenum, tungsten, chromium, cobalt, vanadium, and silver. In petroleum refining, rhenium has been found to be an acceptable substitute.

Substitutes for vanadium in high-strength low-alloy steels include columbium, molybdenum, manganese, titanium, and tungsten. Metallic platinum can replace vanadium compounds as catalysts in some chemical processes. No acceptable known substitute currently exists for vanadium in titanium alloys.

As can be seen from the previous description, not only are some of these five metals (particularly chromium and platinum) relatively scarce and difficult to substitute, but their few substitutes are often also scarce compared with other minerals in the earth's crust, such as aluminum and copper.

According to current knowledge, alternative sources of supply for chromium and platinum are few, adding to their strategic nature. Only two other countries other than South Africa produced more than 1 million tons of chromite in 1984--the Soviet Union and Albania. These latter two countries together produced 40 percent of the world's chromium supply in 1984. Zimbabwe has a relatively large reserve base of shipping grade chromium (11 percent of the world total) but only produces one-fifth of the chromium that South Africa produces. Other current sources of chromium for the United States (following South Africa's 55 percent share of imports) are Zimbabwe (8 percent of total imports), the USSR (7 percent), and the Philippines (6 percent).

The United States imports 49 percent of its cobalt requirements from Zaire and Zambia, the bulk of which is transported through South Africa because of the effects of guerrilla activity on alternate rail lines through other countries. These two countries produced 62 percent of the world's cobalt in 1984. Australia, Canada, Cuba, and the Soviet Union each produced about 7 percent of world cobalt production. Zaire, Cuba, and New Caledonia, and the United States have large reserve bases (each greater than 950,000 short tons cobalt content). The United States possesses about 10 percent of the total world reserve base of cobalt; however most of this reserve base is subeconomic at this time. Such reserves would become economic at some price; however, the lead time for their development is generally considered to be several years depending upon conditions. Therefore, in the event of a national emergency with less than three years' preparation time, the United States would still be vulnerable to disruption of cobalt supplies. Air freight shipments out of Zaire would only be economical if cobalt prices increased.

In addition to Zaire and Zambia, the United States imports cobalt from Canada and Japan. Canada and Japan have reserve bases only a fraction the size of Zaire's.

Manganese production is slightly more diversified than chromium and cobalt production. Australia, Brazil, Gabon, and China each produce approximately 8 percent of the world's manganese. The Soviet Union is the largest producer, with 47 percent of the world total. Although the Republic of South Africa has the largest reserve base for manganese, it produces only about 11 percent of world production. Behind South Africa's 71 percent share of the world reserve base are the Soviet Union (21 percent of the total), Australia (5 percent), and Gabon (4 percent).

The Soviet Union is the world's largest producer of platinum group metals, with 54 percent of the total. Besides the USSR and the Republic of South Africa, other countries produce only very small amounts. South Africa possesses 81 percent of the world's platinum reserve base. The United States also imports small amounts of platinum from the United Kingdom and the Soviet Union. While recycling of platinum from automotive catalytic converters is possible, the Office of Technology Assessment estimates that it will not be until the mid-1990's that recycling will produce enough platinum to meet domestic needs. Significant price increase could accelerate this timing.

The Soviet Union is also the world's largest producer of vanadium, accounting for 33 percent of the total. China, Finland, and the United States also produce significant amounts. South Africa accounts for almost 50 percent of the world reserve base of vanadium, but the Soviet Union, the United States, and China also have significant resources. Along with South Africa, Canada and Finland export vanadium to the United States.

In addition to conventional sources of these minerals, some resources have been found to exist in deep sea nodules and in the Exclusive Economic Zones. However, these resources are not currently economically or technologically recoverable.

Because of the large amounts of these five minerals that the United States imports from or through South Africa, and their limited alternative sources, a peacetime cut-off of supply from that country could result in significant to substantial short-term price increases for our domestic industries. Excess capacity, private stocks and substitution would reduce some of the effects of such a cut-off for some of these materials. For national emergencies, the President believes that these factors plus the national defense stockpile provide the necessary assurance to meet U.S. requirements for defense, industrial, and civilian activities. It can be stated that in the least, the role of South Africa in supplying minerals to the U.S. and its European and Japanese allies must be assessed on a continuous basis.

Mr. Brown. Thank you, Mr. Wilson.

Mr. Maguire, would you proceed with your statement?

STATEMENT OF RICHARD A. MAGUIRE, ASSOCIATE DIRECTOR FOR NATIONAL PREPAREDNESS PROGRAMS, FEDERAL EMERGENCY MANAGEMENT AGENCY

Mr. Maguire. Yes, sir, Mr. Chairman.

Mr. Chairman, members of the subcommittee, I welcome this opportunity to testify on behalf of the Federal Emergency Management Agency on the impact of a possible cutoff of critical materials from South Africa. My remarks today address the use of the national defense stockpile of strategic and critical materials and other short- and long-term actions to mitigate the effects of such a disruption.

We are responsible for mobilization planning of the civil sector in support of national defense objectives. As the Associate Director for National Preparedness, I am tasked with the planning and coordination of national security programs, including such areas as industrial mobilization preparedness. Within this framework, I am concerned with the availability of the resources that industry uses and in the ways these resources can be brought to bear to meet national security needs. Within the area of industrial mobilization, our responsibilities include the coordination of the planning for the national defense stockpile of strategic and critical materials.

The purpose of the national defense stockpile, as provided in section 2 of the Strategic and Critical Materials Stockpiling Act, is to provide the acquisition and retention of stocks of certain nonfuel strategic and critical materials. These stocks are to preclude, when possible, a dangerous and costly dependence by the United States upon foreign sources for supplies of such materials during a national emergency.

On July 8, 1985, the White House announced the administration's new program to modernize the national defense stockpile. This proposal resulted from the President's April 5, 1982, "National Materials and Minerals Program Plan and Report to Congress," which stated the intent to improve the Nation's preparedness for national mobilization. A 2-year interagency study, chaired by the National Security Council, addressed the national security requirements for strategic and critical materials in the event of an emergency.

The President decided to modernize the national defense stockpile to meet the Nation's requirements with a stockpile valued at $6.7 billion for the 42 materials included in the study. This level is more than ample to meet U.S. requirements in the event of a 3-year conventional, global conflict, and includes some substantial stocks of essential materials such as cobalt, chromium, and manganese. Stock levels that would be retained are in excess of recent annual U.S. consumption levels. The administration intends to continue to consult and work with the Congress on the implementation of this proposal.

Current inventories in the stockpile include the following materials which are normally imported from South Africa: antimony, asbestos, industrial diamonds, fluorspar, chromium, iridium, manganese, palladium, platinum, and vanadium. Materials in the stockpile may be released for use, sale, or other disposition on the order of the President at any time it is determined that the release of such materials is required for purposes of the national defense, and in time of war declared by the Congress or a national emergency.

The impact of a possible disruption of strategic and critical materials in peacetime can be mitigated by the marketplace. For national emergencies, the national defense stockpile would be available, as would other authorities such as the Defense Production Act. If warranted, the Defense Production Act of 1950, as amended, provides authorities to develop existing or new sources of supply through loan or purchase guarantees, as well as to allocate existing supplies to national defense needs.

Research and development in the area of strategic and critical materials, as provided by section 8(a) of the Stockpile Act, is delegated to the Secretary of Interior. The Stockpile Act states that scientific, technologic, and economic investigations are to be conducted to determine and develop new domestic sources of supply, devise new methods for the treatment and utilization of lowergrade reserves of such ores and mineral substances, and develop substitutes. These efforts have resulted in the exploration of offshore deposits of strategic and critical materials, the investigation of domestic sources for these materials, and new recycling techniques. Reduced materials dependency will be the short- and long-term result of these efforts.

Mr. Chairman, that completes my prepared remarks. I will be happy to address any questions that you or other members of the subcommittee might have.

Mr. BROWN. Thank you, Mr. Maguire.

Mr. Horton, you are not responsible for the development of stockpile policy. Your responsibilities are, as indicated by Mr. Maguire—speaking broadly of the Department of Interior here—you have a continuing responsibility to assist, through research and development, to maintain a supply of critical materials, but you don't determine how much is required in the event of national emergency.

Mr. HORTON. No, sir; we provide input from our statistical activities as to production and supply opportunities, but we do not make the determination.

Mr. BROWN. Mr. Horton, we have a little problem with getting information from you in a timely fashion. We wanted you and we requested you this summer to analyze various, different scenarios for a cutoff of materials from South Africa, and we haven't got it yet. We hope that we'll get it shortly.

Mr. HORTON. Yes, sir; Mr. Chairman, I apologize for our lateness in making that delivery. The task has grown larger than we originally anticipated. We are working on it with substantial staff and I would hope to deliver it in the near future.

Mr. BROWN. We would hope that in the event of a real national emergency you could produce that analysis much more quickly. Is that true?

Mr. HORTON. Yes, sir.

Mr. BROWN. And that your only reason for not getting it to us quickly is, you just don't think the Congress is that important.

Mr. HORTON. No, sir; I think Congress is very important.

Mr. **Brown.** Well, I'm not reassured, with the speed with which you have delivered it, that you really do, but we will accept your commitment to get it to us shortly.

Mr. **Horton.** Thank you, Mr. Chairman.

Mr. **Brown.** Do you have any questions, Mr. Lewis?

Mr. **Lewis.** Yes, Mr. Chairman, I have a few questions.

Mr. Horton, having been in South Africa, how would you rate the likelihood of a cutoff of mineral supplies?

Mr. **Horton.** Let me speak to that from two aspects, if I may, one as regards their ability to mine and produce. What I was told by South Africans, and I believe, is their determination to continue those productions and to not use them as the lever against any trading partner—that they are highly reliable. As regards the present unrest, I am certainly not as well qualified as the State Department to address that issue, but it would be my—I would agree with the general tenor of the comments that——

Mr. **Lewis.** Mr. Horton, I think you are qualified. The State Department can't even tell how many people were on the ship that was hijacked.

Mr. **Horton.** Yes, sir.

Mr. **Brown.** You don't want Mr. Horton to put his job at risk, though, do you?

Mr. **Lewis.** No.

Mr. **Horton.** I was impressed with the organization. It is my personal opinion that a revolution would be very difficult down there because of the strength of the South African Army.

Mr. **Lewis.** Economists often mention diversification and substitution as quick answers to mineral cutoffs. As a mineral expert with a great deal of experience in mining, what are some of the technical reasons why we might not be able to so quickly diversify?

Mr. **Horton.** Supply, costs, and application would be three fast words. You must have a supply of the alternate. Substitutions would occur now if it was economically advantageous to do so. The fact that we do not have more substitutes for chromium is because it is less expensive to use chromium at the present. As the price of chromium would increase, substitutes would be searched for and some would be found, but there are some applications, particularly with platinum and manganese, too, where there are no known substitutes.

Mr. **Lewis.** Is there a—could we be assured, for example, that other suppliers would pick up the slack in the event of any cutoff?

ANNUAL WORLD MANGANESE ORE PRODUCTION AND CAPACITY IN 1984
(THOUSAND SHORT TONS, MANGANESE CONTENT)

COUNTRY	ANNUAL PRODUCTION 1/	ANNUAL CAPACITY	PERCENT OF CAPACITY UTILIZED	AVAILABLE CAPACITY
U.S.S.R.	3.300	3,800	86.8	500
SOUTH AFRICA	1,294	3,300	39.0	2,006
GABON	1,079	1,300	83.0	221
BRAZIL	1,055	1.350	78.0	295
AUSTRALIA	931	1.300	71.6	369
CHINA	503	550	96.0	47
INDIA	522	800	96.0	278
MEXICO	218	300	65.0	82
GHANA	132	150	88.0	18
	9,034	12,850		3,816

1/ ESTIMATED.

CHART 9

ANNUAL WORLD CHROMITE PRODUCTION AND CAPACITY IN 1984
(THOUSAND SHORT TONS, CHROMIUM CONTENT)

COUNTRY	ANNUAL PRODUCTION	ANNUAL CAPACITY	PERCENT OF CAPACITY UTILIZED	AVAILABLE CAPACITY
ALBANIA	296	323	91.6	27
BRAZIL	90	125	72.0	35
CUBA	11	29	33.0	18
FINLAND	46	187	24.6	141
GREECE	11	17	64.7	6
INDIA	149	190	78.4	41
IRAN	18	30	60.0	12
MADAGASCAR	9	42	21.0	33
NEW CALEDONIA	31	33	93.9	2
PHILIPPINES	68	170	40.0	102
SOUTH AFRICA	1.021	1.460	69.9	439
SUDAN	9	10	90.0	1
TURKEY	174	240	72.5	66
U.S.S.R.	1,152	1,152	100.0	0
ZIMBABWE	171	377	45.4	206
OTHER	8	8	100.0	0
TOTAL WORLD	3,264	4,393		1,129

CHART 10

Mr. Horton. We can't be assured, no, sir. I have, at your desire, I have some charts (charts 9 and 10) that show the present supplies and alternate supplies for manganese and chromium. I believe you have been given copies of them but I would be pleased to discuss them if you wish.

Mr. Lewis. Could they be reduced for the record?

Mr. Horton. Yes; they are reduced, and I believe if you haven't gotten copies you will have them very shortly. In looking at them, be careful to look at where the excess capacity is available. If I might just briefly, in chromite, for example, we show excess capacity in South Africa and in Zimbabwe. Well, in a cutoff that excess capacity would not be available, so you want to pick your countries where the available capacity exists that is available. That doesn't necessarily mean it has come on line. There has to be an economic advantage.

One of the problems—and I am not speaking specifically to South Africa at this moment but—when interruptions occur in the mineral supply for whatever reason, new supplies do not automatically come on, in that those who would invest in the new supplies, which will normally be at higher cost because if they weren't at higher cost they would be producing at the present time, so they must look for a higher cost, and when there are shortages the costs go up. The potential supplier must judge how long that lost supply is going to be off the market because, if it's not off very long, he will suffer a severe loss by trying to start up an operation that will shortly become uneconomic.

Mr. Lewis. Going back to my first question, you have mentioned in the past that South Africa has been an efficient, low-cost, reliable supplier of minerals. Do you see this continuing in the future? You answered the question about the cutoff. Do you see South Africa continuing to supply?

Mr. Horton. Yes; I do.

Mr. Lewis. I would like to know, Mr. Horton, what was the role of the Bureau of Mines in the determination of the new stockpile goals as they were announced by the White House in July of this year? What role did you all play?

Mr. Horton. Dr. Morgan of my staff participated in the discussions that led to establishing the stockpile. Many of their considerations, I am advised, were classified. I did not participate in those discussions, nor do I believe any other members of the Bureau of Mines did, and I have not received a classified briefing on the stockpile or the factors that affected it. I don't want to minimize Dr. Morgan's work in that area—he is a longtime expert on mineral supplies and demands—but I have no personal knowledge of the establishment of those goals.

Mr. Lewis. Mr. Wilson, did you take part in any, or your Department?

Mr. Wilson. The part of the Department that worked on that was not my office. We had minimal input and I have never received a classified briefing on that particular study.

Mr. Lewis. How about you, Mr. Maguire? The same answer?

Mr. Maguire. FEMA did participate, was responsible for many of the analytical economic analyses that were required to arrive at the final result. There were thousands of man-hours expended by over 100 professionals throughout the Government. Members of the task force included members from State Department, Treasury, Defense Department, and perhaps 13 other agencies of the Federal Government, all of whom are involved in the routine, day-to-day process of formulating stockpile goals and maintaining the stockpile. There were eight separate committees used to make up the total analysis. Each one of those committees had an analysis to do, and then those analyses were tied together at the conclusion of the work.

Mr. **Lewis**. You know the degree of the U.S. dependence on minerals from South Africa. In that light, how can you justify a stockpile with zero goals for manganese, and platinum, and vanadium?

Mr. **Maguire**. My goals for those materials are currently the goals established between Congress and the administration in 1979, and the inventory of the stockpile today is sufficient to provide the needs that are there for national defense purposes. We have sufficient material in the stockpile to handle any known requirements. We have proposed to the Congress a new set of goals. The details of the way that those goals were arrived at and the analysis, the specific analyses, are classified, as Mr. Horton has testified. However, we are working very closely with the Congress. There are representatives of the Congress working right now with the National Security Council on the details of that analysis, to come up and to honor the administration's commitment to consult and work with the Congress on the development of stockpile goals.

Mr. **Lewis**. Can any of you three gentlemen—are you aware of any recommendations for the proposed goals to Secretary Hodel? Are you aware of any recommendations of the proposed goals to him?

Mr. **Maguire**. I don't understand the question, sir.

Mr. **Lewis**. Well, I'm just trying to find out what position he took and whether or not he took a position on the proposed goals that you are aware of at this time.

Mr. **Maguire**. Mr. Congressman, I think the only thing that I can relate to you is, this is an administration position. It was announced in the press release, and one would assume that all members of the administration are in agreement with the proposal and accept it simply as that, a proposal to consult and work with the Congress to work out, to formulate, the stockpile requirements.

Mr. **Lewis**. I have one final question. I would like to know if you have done any analysis whatsoever on how many Americans would be put out of work as a result of the economic dislocations that would occur with a cutoff from mineral supplies in South Africa. Has Commerce done anything on that, or Bureau of Mines, or yourself, Mr. Maguire?

Mr. **Horton**. We hope to be able to address that in the report that we are preparing on labor impacts.

Mr. **Lewis**. When will that report be available?

Mr. **Horton**. I would hope we would have it—my hopes are commonly realized in the Bureau of Mines—I would hope that we would have it available for review by the administration within 2 weeks.

Mr. **Lewis**. Thank you, gentlemen.

Thank you, Mr. Chairman.

Mr. **Brown**. Thank you, Mr. Lewis.

Gentlemen, I think it is no secret that what concerns us is, the administration's policy proposal calls for a drastic reduction in the level of the stockpile, particularly in that part that would be required to meet the requirement for a protracted military conflict. The apparent size of the stockpile is reduced to about $700 million.

Now I am not sure I understand completely what this situation is, and maybe one of you can explain it to me. Do you have two categories within this stockpile, a tier 1 and a tier 2 category, in which there is—do you want to speak to that, Mr. Maguire?

Mr. **Maguire**. The proposal, the new goal proposal by the administration includes two tiers.

Mr. **Brown**. All right.

Mr. **Maguire**. One represents the goals, as concluded by the analysis, of $700 million worth of stockpile materials. A second tier, called a supplemental reserve in the administration's proposal, includes some $6 billion worth of additional materials which in the administration's proposal would be retained as a supplemental reserve for a 5-year period. At the conclusion of that 5-year period it is our recommendation that a followup survey, a new look at the total requirements, be generated at that time, so that this supplemental reserve is a contingency and would not be lost from the stockpile.

Mr. **Brown**. In the near term.

Mr. **Maguire**. The total stockpile, then, in terms of how much inventory would this Nation have for national defense purposes, would total some $7 billion worth of stockpiled material.

Mr. **Brown**. As compared to the existing plan, which calls for how many dollars?

Mr. **Maguire**. The 1979 goals were approximately $14 billion.

Mr. **Brown**. I hear $16 billion. Is there another bidder? [Laughter.]

Mr. **Maguire**. Mr. Chairman, I would like to provide that for the record and name a specific date, as of——

Mr. **Brown**. We don't need to be too picky about the dollars and cents, but the rough order of magnitude.

Mr. **Maguire**. Rough order of magnitude.

Mr. **Brown**. Roughly, then, you are proposing or the new study sets goals that are somewhat less than half, and of that an additional 45 percent is in tier 2, which is for a 5-year period and may be completely eliminated after that.

Mr. **Maguire**. The plan includes a disposal of excess stockpiled material over 5 years, for $2.5 billion worth of surplus stockpiled materials.

Mr. **Brown**. Now can you tell me exactly why the discussions entering into this are classified?

Mr. **Maguire**. I don't believe I should go into that here, Mr. Chairman. I would be pleased to speak with you privately and tell you.

Mr. **Brown**. Are you sure it has nothing to do with the desire to balance the budget, and you have classified that? [Laughter.]

Mr. **Maguire**. Yes, sir, I'm sure. There are very highly classified inputs into many of the analyses that were done, and I would not want to say that it was done for any other purpose other than for national security interests.

Mr. **Brown**. Well, I will go into that later in a classified setting, but I'm sure you know that some of the Members of Congress who have been most concerned with stockpile policy for a generation and who are privy to all classified information disagree very strongly with the recommendations that have been made. You do understand that?

Mr. **Maguire**. Yes, sir, I understand that.

Mr. **Brown**. OK. We may have a few additional questions that we would like to submit to you gentlemen, and we would appreciate it if you could supply the answers to them in a reasonably timely fashion. Is that agreeable?

Mr. **Maguire**. Yes, sir.

Mr. **Horton**. Yes, sir.

Mr. **Brown**. If it's agreeable, I will excuse you now. If it's not, I'll keep you here all day.

Mr. **Wilson**. It's agreeable.

Mr. **Brown**. Thank you.

The next witness will be Mr. Lance Antrim, on behalf of the Office of Technology Assessment, who will be accompanied by Mr. Wendell Fletcher. All right. We'll get the right name tags up there in a minute.

Do you want to present your testimony, Mr. Antrim?

STATEMENT OF LANCE N. ANTRIM, CONSULTANT TO THE OFFICE OF TECHNOLOGY ASSESSMENT, U.S. CONGRESS, ACCOMPANIED BY WENDELL FLETCHER, SENIOR ANALYST, INDUSTRY, TECHNOLOGY, AND EMPLOYMENT PROGRAM, OTA

Mr. **Antrim**. Mr. Chairman, I am pleased to have the opportunity today to present to you the findings of the OTA study entitled, "Strategic Materials: Technologies To Reduce U.S. Import Vulnerability."

My name is Lance Antrim. I am currently manager of the International Negotiation Studies Program at the American Academy of Arts and Sciences but today am appearing as a consultant to the Office of Technology Assessment. From 1982 to 1985, I was a project director at OTA, where I was responsible for the strategic materials assessment. I am joined by Wendell Fletcher, senior analyst in the Industry, Technology, and Employment Program at OTA and one of the authors of the OTA report.

I would like, sir, to submit the written statement for the record and present a brief summary of the statement.

Mr. **Brown**. That will be satisfactory, and the full text will appear in the record.

Mr. **Antrim**. Thank you, sir.

In 1982, this committee and the Senate Committee on Commerce, Science, and Transportation asked OTA to examine a number of issues related to strategic materials. For our purpose, to meet the needs of the requesting statements, we defined strategic materials to be those materials which are critical to the national defense and to the civilian industrial economy and for which there is a high potential of interruption of supplies.

I would like to note one limit to the scope of the OTA study. The study is focused on the needs of the peacetime economy, not on wartime situations. In particular, OTA did not specifically examine either the national defense stockpile nor the Defense Production Act.

The OTA study examines the cases of chromium, cobalt, manganese, and platinum-group metals, making the study particularly relevant to today's hearings. As noted by prior witnesses, South Africa is the major producer and transporter of these metals.

Since World War II, the United States has experienced at least four major supply interruptions. In all cases the U.S. response included a combination of three technical approaches: Mineral production and metal processing; substitution; and conservation.

OTA found that the potential exists for developments in each of these three areas to aid the United States in times of future supply interruptions. The opportunities vary by material and there are limits to the speed at which these technologies can be implemented and the contribution each one can make.

New mineral production offers the greatest potential in the case of cobalt. Expansion of diversified deposits is promising for manganese. There is a strong potential for development of platinum resources in the State of Montana. However, all new mineral developments will require 2 to 5 years or more to come online, and in some cases higher metal prices are needed before development will be undertaken by private industry.

Substitution offers the greatest potential for responding to interruptions of chromium and cobalt supply. Some alternatives are on the shelf, others are in testing, and others—such as ceramics, composites, and advanced materials—are still in basic research. In more critical applications such as jet engines and energy facilities, years of testing are required before substitute materials can be qualified for use.

Conservation in steelmaking offers the greatest potential to reduce manganese needs, but major reductions will take over a decade to come into force. Recycling of the automobile catalytic converter is the largest potential source of platinum, but large-scale recycling must overcome the current depressed precious metal prices and the lack of an infrastructure for collecting converters from dismantling yards.

Improved manufacturing technology in the production of jet engines has already contributed to reductions in the need for cobalt and chromium, and further reductions are likely to take place over the next 5 to 10 years.

Of this range of technical approaches to deal with supply interruptions, it is only in the case of conservation that the technologies are being put into commercial application to a significant degree. If the United States wishes to prepare for a supply interruption, there are a range of actions that may make more of the technical alternatives readily available. These actions include efforts to increase the collection and dissemination of minerals and materials information; support for basic research; applied research in the testing of materials; development of new alloys; testing of prototype processes; and assistance to private industry in putting the technology in place.

Mr. Chairman, OTA's findings represent only a part of the range of issues and actions that comprise U.S. materials policy. As such, OTA found that a central policy mechanism such as found in the Critical Material Council is needed to integrate the alternatives into an efficient and effective national strategic materials policy.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Antrim follows:]

STATEMENT OF
LANCE N. ANTRIM
FOR THE
OFFICE OF TECHNOLOGY ASSESSMENT
BEFORE THE
SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS
OF THE
COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
October 10, 1985

Mr. Chairman, members of the committee, I am pleased to have the opportunity to present to you today the findings of the report of the Office of Technology Assessment entitled Strategic Materials: Technologies to Reduce U.S. Import Vulnerability.

My name is Lance Antrim. At present, I am manager of International Negotiation Programs at the American Academy of Arts and Sciences, but am appearing today as a consultant to the Office of Technology Assessment. From 1982 to September 1985 I was a project director with the Office of Technology Assessment, responsible for the assessment of strategic materials issues. I am accompanied by Wendell Fletcher, Senior Analyst in the Industry, Technology and Employment Program at OTA and one of the authors of the OTA report.

In 1982, this Committee and the Senate Committee on Commerce, Science, and Transportation asked the Office of Technology Assessment to examine a number of issues related to strategic materials. The charge to OTA was to identify specific problems related to U.S. dependence on potentially unreliable sources of supply and to propose possible actions to reduce the potential harm from interruptions of supplies to the U.S. As with all OTA studies, the role is to identify options for elected officials, not to choose among them.

OTA was specifically directed to examine issues related to chromium, cobalt and platinum group metals. After a review of materials that are essential to the U.S. economy and whose supply, to a significant portion of total U.S. needs, is uncertain, OTA added manganese to the metals under examination. The fact that OTA's study was limited to these specific metals should not suggest that they are the only materials that are strategic, rather they form the first tier of strategic materials. A second tier of nine additional materials was also identified, but the study concentrated its efforts on the four. While many of our results may be applicable to other strategic materials, care should be exercised in extrapolating beyond the four. This brings me to a point of definition. Several definitions of strategic materials have been used over time. For our purpose, we defined strategic materials to mean materials that have both a high degree of criticality and a high potential for interruption of supply. Criticality refers to whether the material is required for essential industrial and defense uses for which adequate substitutes may not be available.

It is important to recognize the other limits in the scope of the study. OTA's focus was on the role that the metals play in the industrial economy and the means available to maintain the functioning of the economy in the event that supplies of metals from current suppliers are unavailable. Thus, the assessment is not a study of wartime situations, where a sudden increase in military requirements would demand a buffer of materials in addition to alternatives to sources of supply that might be lost or interrupted. At the time of the OTA study, the National Defense Stockpile was under review and Congress did not ask OTA, nor did OTA choose, to undertake a similar review.

Materials Supply Vulnerability

OTA found a strong historical basis for concern about the continuation of strategic materials supplies. In 1949, the Soviet Union, then a major supplier of manganese and chromium to the United States, cut off exports to the U.S. in response to rising tension in Berlin. In response, the United States provided assistance to India and Turkey to develop new supplies. In 1969, supplies of nickel from Canadian mines were curtailed during a nickel strike. The major response was to conserve materials and to use substitutes, such as high-manganese stainless steel as a replacement for high-nickel stainless steel. From 1966 until 1972, the U.S. participated in a U.N. embargo on chromium from Southern Rhodesia (now Zimbabwe). Markets realigned so that chromium was available to the U.S. but the most important factor was the widespread adoption of the argon-oxygen decarburization process for making stainless steel which allowed the use of high carbon ferrochromium made from chromite from South Africa, a substitution not feasible under earlier stainless steelmaking technology. And in 1978 and 1979, the world cobalt market was disrupted as concern arose about rebel activity in Zaire. In response, cobalt by-product recovery from nickel mines was increased, industrial scrap was recycled to obtain the cobalt content, reduced cobalt alloys were substituted in place of high cobalt alloys, and ceramic magnets replaced cobalt-bearing magnets in many applications.

These supply interruptions had limited impact on the domestic economy and on national security because of a combination of market response, government intervention, and technical ingenuity on the part of both government and private industry. But each case was unique. If future interruptions occur, new responses will be needed. OTA's study assesses the potential technical responses and their prospects for mitigating the effects of supply interruptions.

The four metals OTA studied are clearly strategic by virtually any definition: they all serve in functions essential to the United States; in the near term they cannot be replaced in many of these functions; and the supplies of the metals may be subject to interruption. The focus of this study on these metals is particularly timely as the United States considers its relationship with the government of South Africa. The Republic of South Africa is a major supplier of chromium, manganese, and platinum group metals. It also serves as a link in the transport of chromium from Zimbabwe (another important source of chromium outside of South Africa) and as an alternative transportation route for cobalt from Zaire (the world's largest supplier).

The value of U.S. imports of these metals from South Africa is about half a billion dollars. This low dollar value hides the importance of these metals in the U.S. economy. Each of the metals studied by OTA is a key element in the U.S. civilian and military economy, and products worth many times that 500 million dollars are dependent on these raw materials. The importance may be illustrated by highlighting the principal applications of the metals and the role of South Africa in their production worldwide.

Chromium is essential in stainless steels, which in turn are needed in refineries, chemical plants, and oil wells. Chromium alloys are used in tools, springs, and bearings, and superalloys require this metal for their high temperature strength and oxidation resistance. Chromium is produced in the USSR and South Africa, which, respectively, accounted for approximately 35 percent and over 20 percent of 1982 world production. Albania, Brazil, Finland, India, the Philippines, Turkey and Zimbabwe accounted for most of the rest. In the 1979-1982 period, U.S. consumption of chromium ranged from 10 to 20 percent of world production.

Cobalt is used in superalloys for jet engines, in magnets for instruments and electric equipment, in tool steels and cemented carbide tools and dies for manufacturing, and catalysts for refineries and chemical plants. Zaire alone accounted for 45 percent of world production of cobalt in 1982 -- Zambia another 13 percent, and the USSR another 9 percent.

Manganese is absolutely essential in the manufacture of every type of steel, which accounts for almost 90 percent of its use. It is also used in aluminum alloys and in some bronzes. Manganese ore production is somewhat more diverse than production of chromium or cobalt, but the USSR still accounts for about 40 percent and South Africa 23 percent.

Platinum group metals are needed in industrial and automotive catalysts, in electronic equipment, and in a number of manufacturing processes. The adoption of electronic switching systems in the telephone system has allowed reduction of platinum and palladium in this use, but that reduction is being offset by the rapid increase in palladium consumption in ceramic capacitors. Production of platinum group metals is largely accounted for by the USSR (over 50 percent) and South Africa (over 40 percent) -- the remainder comes from other countries where it is a by-product of other mining operations.

Options to Prepare for Supply Disruptions

The responses to past disruptions illustrate the variety of ways to address materials import vulnerability. The responses to supply disruption may be divided into three groups: mineral production and metal processing; conservation; and substitution. OTA examined the potential for technologies in each group to reduce materials import vulnerability. I would like to summarize for you the important alternatives for action to reduce U.S. materials import vulnerability in terms of their near term and long term contribution.

Immediate Actions

The United States has two important laws to protect the military needs of the country from supply interruptions: the Strategic and Critical Materials Stockpiling Revision Act and the Defense Production Act. The National Defense Stockpile contains raw material to meet national defense, industrial and essential civilian requirements in a war or national emergency. The Defense Production Act may be used to require suppliers of defense equipment to allocate materials in short supply to meet their contracts with the Defense Department, with possible diversion of material from civilian applications. Thus, these measures should not be seen as insulating the civilian economy from supply interruptions.

Past experience, particularly the cobalt panic in 1978 and 1979, has shown that the management of material for the stockpile and the potential application of the Defense Production Act to allocate materials in short supply to defense applications can have an effect on civilian response to supply interruptions.

When the civilian sector is uncertain about what measures government is taking to deal with disruptions, the non-military demand for metals in short supply can have sudden and drastic increases which can result in major price rises and decreases in availability, all of which are passed on to the consumer either as increased prices or shortages of products. Much of this problem can be avoided if government policy on the management of the stockpile and the Defense Production Act is developed in consultation with key consumers and producers of strategic materials.

Near-Term Actions

There are a number of important actions that can be taken to reduce materials import vulnerability in the near term of one to five years.

Substitution has a great deal of potential to reduce chromium vulnerability--especially in non-essential applications. In many applications, stainless steel containing 18 percent chromium is specified when lower chromium alloys have been developed that could be used. In still other applications, coatings and surface treatment technologies can also reduce the need for stainless steel, but may entail additional costs in fabrication.

Conservation, principally recycling, is also an attractive option for chromium. While considerable chromium in waste from stainless steelmaking plants is now being recycled, much more chromium from scrap automobiles, especially from the shell of the catalytic converter, could be recycled. This opportunity will depend largely on the economics of platinum group metal recycling from the catalytic converter, not new technology.

In the near term, a promising technology for cobalt conservation is in the near-net-shape fabrication of superalloy components. Near-net-shape technologies allow parts to be produced in ways that reduce machining that would otherwise produce scrap, much of which would be downgraded. Near-net-shape technologies can reduce scrap production in manufacturing aircraft engine components by 50 percent or more. Also, more recycling of cobalt from some kinds of obsolete scrap and from refinery catalysts is possible, with increased metals prices or reduced investment costs.

While there are no significant opportunities for development of major new domestic manganese deposits, there is the possibility to diversify foreign suppliers to reduce dependence on individual suppliers. Currently, manganese mines around the world are not operating at full capacity. Increasing production to reach full capacity could reduce, but not eliminate, a hypothetical shortfall in production from South Africa. Expansion of the capacity of existing mines could further increase manganese availability within one and a half to two years. However, the need to adapt plants to the characteristics of different ores, and to refurbish and expand ferroalloy processing facilities, in addition to other factors, could delay the response of the manganese market to changing production patterns.

Recycling is an important near term conservation option for platinum group metals. Since the mid-1970's, the largest use of platinum group metals has become the automotive catalytic converter. The increasing number of converter equipped cars now reaching the dismantling yards is a very promising potential domestic source of platinum group metals. Cars with converters are now entering dismantling yards in sufficient quantity to supply the raw material for a platinum recycling industry. The greatest barrier to the development of the industry is the lack of an infrastructure between the dismantlers and the processors, which, in turn, is due largely to the current low market price for platinum. Although some platinum is already recycled from converters, a major increase in platinum group metal prices that would likely arise in a supply disruption would probably stimulate development of more effective linkages between dismantlers and processors in a relatively short period of time -- certainly a year or so.

The most significant opportunity for diversifying PGM production is in the United States in the Stillwater deposit in Montana. This deposit is currently being evaluated for development and the decision to go ahead rests on long term projections of demand and price for platinum and palladium.

The Importance of Information: In light of the Subcommittee's interest in ways to enhance information and data analysis capabilities with respect to strategic materials, I would like to summarize some of OTA's findings about the role of information in implementing the technical alternatives addressed by our report. The Federal Government has long played a key role in provision of information about strategic materials. However, an expanded Government information effort could enhance U.S. capabilities to deal with supply disruptions--both in the near and long term.

Collection and analysis of data is one important role for government. For example, government-sponsored studies on scrap flows of strategic materials throughout U.S. industry can help to identify the substantial quantities of cobalt or chromium that might be recycled in a supply emergency, but are now downgraded or lost. While such studies have been conducted in the past, they need to be repeated on a regular schedule if they are to give a reliable picture of the potential contribution of recycling in a supply disruption.

Another very important role for government is in disseminating information to industry. For example, as I have mentioned, some "on-the-shelf" substitutes already exist which could help industry deal with chromium supply problems--but many firms have little or no knowledge about these alternatives. They need information about the availability of suitable substitutes, about modifications in production processes needed to properly fabricate the substitutes, and about the behavior of the substitutes in field conditions.

OTA found substantial merit in proposals for the establishment of a centralized substitution information bank that would make information on substitute materials readily available to civilian consumers of strategic materials. Operating in coordination with the national defense stockpile, the substitution information bank could also improve the management of the stockpile by supplying up-to-date information about the potential use of substitutes in defense applications.

Long-Term Actions

There are many opportunities to develop new cobalt sources from mines around the world, notably in Peru, the Philippines, New Caledonia, and the United States. The cost of cobalt from these deposits is generally estimated to be significantly higher than the recent market price of about $12.00 per pound; estimates for U.S. deposits in Idaho, California and Missouri range from $16 to $25 per pound. Zaire has an interest in not exceeding the lower bound of the range expressly because it might lead to new competition.

For chromium, there is only limited potential to diversify supplies by expanding production from other known deposits. U.S. chromium resources are limited in extent and expensive to mine. There is the possibility that new deposits may be found, but, with the exception of limited areas where mineralized areas are exposed to the surface, exploration must be done by drilling core samples, a very costly process. The potential to discover economic deposits of chromium, as well as of other strategic materials, can be enhanced by the development of exploration methods and equipment including theoretical understanding of the process of formation of mineral deposits; computer assisted exploration and analysis; and improved geochemical, geophysical, and drilling tools. By reducing the cost of exploration, and by the targeting of government exploration activities at specific strategic materials, the prospects of discovering domestic deposits might be increased. However, since exploration for and development of mineral deposits is a long undertaking, these activities are of value principally in the long term of 10 to 20 years.

Long term substitution potential for cobalt is promising. Laboratory research indicates that the cobalt content of some superalloys, the largest and one of the most essential cobalt uses, can be reduced by up to 50 percent. Unlike some other substitution possibilities, research indicates that reduced cobalt alloys can be developed that appear equivalent to alloys now in use. But this reduction is possible only if expensive and time consuming testing is conducted. Such tests may take five years and several million dollars for jet engine applications; as a result, support for development of low cobalt alloys is a long-term proposition. In the ten year and greater time frame, significant reduction in cobalt content of superalloys is possible if new alloys are introduced and tested in conjunction with the designing of new engines.

The long term potential for the development of non-metallic advanced materials that may eventually replace strategic materials is promising, but many years of basic and applied research are needed. In addition, non-technical barriers must be overcome, including the development of materials testing standards appropriate to the materials, the education of designers in the use of ceramics and composites, and the development of manufacturing processes for the low cost and reliable production of ceramic and composite parts.

The most promising approaches for conserving manganese are in the use of manganese in steelmaking, and these approaches are being implemented without government involvement. External desulfurization, increased use of electric arc furnaces and steel scrap, conservation through continuous casting of steel, and changes in the mix of steel products are leading to a major reduction in the amount of manganese needed to produce a ton of steel. Some manganese is contained in domestic iron ore, so the reduction in the manganese requirements for steelmaking will be reflected in substantially reduced need for imports of manganese ore and ferromanganese. It is possible that steelmaking uses of imported manganese will decline by about 45 percent per ton of steel production by the end of the century.

Conclusions

There exist a wide range of possibilities to reduce U.S. vulnerability to interruptions of supplies of strategic materials, both in the near term and the long term. This is due, in large part, to the efforts of government agencies, such as the Bureau of Mines, NASA, the Department of Defense, the National Bureau of Standards, the DOE National Laboratories, in addition to the effort of private firms and academic institutions.

OTA found that responsibilities for the development and execution of materials policy are spread over a number of Departments and agencies. Responsibilities for planning are also carried out by a number of interagency groups, with the result that materials policy is often lost among more immediate political and policy concerns. As a result, OTA identified the need for a central materials policy planning body. The National Critical Materials Council, mandated by the National Critical Materials Act of 1984 to be under and reporting to the Executive Office of the President, would be able to fulfill this role, if it were given full support within the Executive Office of the President.

If the nation is to guard against the effects of possible interruptions of materials supply in the near future through these technological alternatives, policy decisions should not be limited to funding of basic research -- they should also involve the selection of and support for more intensive development of particular technical options. The prospects for successful implementation of these options could be helped through definition of objectives by the Administration, and through effective coordination of Executive Branch activities. These efforts need not require major increases of funding. Most of the technical alternatives identified by OTA, while relatively inexpensive, are targeted at problems of high importance. OTA grouped potential federal activities into five groups, roughly corresponding to the degree of federal involvement and commitment of resources.

First, the government can increase its resources devoted to the collection and analysis of data, including information on mineral deposits, foreign investment opportunities in specific strategic minerals, behavior of substitute materials, materials flow of industrial and obsolete scrap and technologies for recycling scrap.

Second, a portion of the research and development in materials science and in mineral exploration technology can be targeted more intensely at strategic materials.

Third, the government can provide support for education and training in the use of ceramics and composites, for research into manufacturing processes for advanced materials, and for testing of properties of advanced materials to reduce barriers that may retard the adoption of advanced materials by industry.

Fourth, specific new manufacturing and recycling technologies and substitute materials can be developed by the government, or cooperatively by government and industry, to provide a stockpile of new technology and substitute materials for rapid implementation in emergencies.

Fifth, the government may encourage investment in new technologies and in mineral development through tax incentives, purchase agreements, and other financial assistance. For example, these policies could be used to speed the modernization of the steel industry (which would have among its other effects the reduction of manganese consumption); to encourage recycling industries that are not now competitive with foreign mineral sources; and to encourage development of new mines, both foreign and domestic. These activities would be expensive, however, so their cost effectiveness relative to the stockpile or other alternatives should be carefully examined.

The debate and selection of specific programs from this list is a starting point. While a variety of actions could be taken, it is clear that choices must be made if any significant actions are to be taken. Finally, and most important, OTA believes that coordinating the formulation of strategic materials policy and coordinating the activities of the many federal agencies involved in strategic materials issues is essential. The National Critical Materials Council could serve in this role, but only if it begins work immediately and is given strong support by the Administration.

Mr. Brown. Thank you very much, Mr. Antrim.

Do you have a statement, Mr. Fletcher?

Mr. Fletcher. No, sir, I do not.

Mr. Brown. Mr. Antrim, we are looking at this problem from the standpoint of how we should, through research and development, act in order to minimize the impact of cutoffs in critical materials. You point to possible development of an information bank relating to substitutions of materials and to improved conservation and use of such materials. Have you given any thought to the institutional arrangements for such an information bank? Where would it best be located, and under what kinds of conditions, in order to be of the greatest assistance to us?

Mr. Antrim. Sir, we didn't get into a detailed proposal as to where it could be located. We found, though, that the Bureau of Standards and the Bureau of Mines had the greatest input into substitution information and recycling information and the development of technology, so they would need to be closely involved.

We also found a great deal of interest from nonprofit but industry-related concerns, such as the American Society for Metals & the Metals Property Council, in having close connection with such an information stockpile. We found that that type of connection will be essential to its success because of the need to relate substitute materials to the actual industry application, each application having a different requirement of properties and in some cases qualification procedures; that it can't be just a Government Information Program. It does need to have close industry cooperation. While we did not look at the national defense stockpile, we also saw the connection between the need for substitution information in planning stockpile goals, with the benefit to our private industry of having that information available in times of shortage. So we don't have a concrete position for it but we know which groups have to be involved with it.

Mr. Brown. Yes; did your study point to the needs for other kinds of information systems or other kinds of analytical activities, including global efforts to analyze supplies, potential reserves of materials, and so on, possibly using some of our global reconnaissance system such as Landsat data or something of that sort? Was that dealt with at all?

Mr. **Antrim**. We began it as a larger effort to look at the role of gathering information on mineral distribution. As it came to responding to particular supply interruptions, it turned out to be necessary to focus more on the exploration as opposed to the prospecting side of that. That does include, however, the development of improved remote reconnaissance systems—whether satellite-based, air-based, or land-based—for determining what lies under the surface cover. All of these technologies appear to be necessary if we are going to explore for minerals either in the United States or to cover wide-scale reconnaissance of deposits in foreign lands, so we do find that type of work to be necessary and the dissemination of information gathered by the Government to potential developers, much as the program that is undertaken in the Trade and Development Program under the Department of State right now.

Mr. **Brown**. Did you get a fix on how much research resources are being devoted to strategic materials at the present time and where that research is being conducted?

Mr. **Antrim**. We do have that information up to 1980 in some detail, and found that the more recent report of the Committee on Materials did not provide it in sufficient detail to do planning for strategic materials policy. We felt that this was one area that did need further work in the Government Information Program.

Mr. **Brown**. You mean the information with regard to the amount and location of the research was not available?

Mr. **Antrim**. With regard to the research and to the materials to which it is applied and to the applications, the information prepared in 1980 was quite detailed, so that you could go through and see not only who was doing the research but what materials it applied to and what consumers of materials it applied to. It was not broken down to that detail in 1983.

Mr. **Brown**. Well, of course the concern of the Congress and this committee in particular has been with improving the institutional mechanism for focusing on the critical materials need. That's why we legislated the development of the Critical Materials Council, and the director, and so forth. We had hoped that it would supply the focus necessary to identify the information gaps, the research needs, and to proceed with the development of a policy structure that would meet the needs of the national welfare. Did your report reach any policy recommendations as to whether there should be a different role for agencies such as OSTP, or OMB, or the National Security Council? Have you been able to identify a focus for this kind of materials policy concern?

Mr. **Antrim**. We identified the need for the central focus. During the course of the study the Critical Materials Act was debated and finally came into force, creating the Critical Materials Council. We found that that met in full the needs for the central coordinating mechanism, and that its location in the Executive Office of the President provided the broad scope to look at programs throughout the Government. We found programs as diversified—not only the Bureau of Standards and the Bureau of Mines, but the Air Force, the national laboratories, the Department of Energy, and even NASA contributing greatly to areas in the full range of materials technology, and that only by having a broad overview and some degree of authority over these agencies could the next step of bringing these technologies closer to implementation be taken.

Mr. Brown. Well, I don't know whether we in this committee developed that point of view from consultation with very wise people like you, or whether it was vice versa, but we came to the same conclusion, obviously.

Do you have any questions, Mr. Lewis?

Mr. Lewis. Two questions, Mr. Chairman.

Mr. Antrim, in your research did you reach any conclusions regarding the relative competitiveness of the U.S. mining operations? Is the United States less competitive from a standpoint of ore grade mining productivity or labor cost, or do we unfairly saddle our industry with burdens not carried by foreign operations?

Mr. Antrim. Sir, because we focused on cobalt, chromium, manganese, and platinum, by our nature we were looking at mineral industries for which the United States has very little and, at times, no production. We have no domestic manganese production. We have no domestic chromium. At times we produce cobalt as a byproduct of other materials, and presently produce some platinum as a byproduct of the copper industry.

It's only in the case of platinum metals that we have a chance of having, in the near term, commercial production of any of these metals. That's the Stillwater deposit in Montana. That deposit appears to be more driven by the currently low precious metal prices than any other factor. It does appear, from our cursory examinations, staying out of proprietary information, that that deposit will be competitive on the world market if precious metal prices, gold prices and platinum, return to their more consistently higher levels. We did not get into a study of domestic copper, lead, aluminum industries, which would require a detailed study in those areas to answer your question.

Mr. Lewis. I see. Did you find in your research what effect does the fact that many mining operations are supported directly or indirectly by their government have on competitiveness of the U.S. operations?

Mr. Antrim. No, sir; we did not get into that direction because of the focus of our work on these four areas.

Mr. Lewis. I see. You advocate the development of alternative technologies and materials. For example, the Government could support the construction and operation of demonstration plants for the testing and evaluation of substitute materials. What do you estimate would be the cost of such a policy, and if the Government sponsored such research funding, for example, chromium, what would be the cost?

Mr. Antrim. We found in the case of, in one example, the testing of substitute materials for aviation use in the critical components of a jet engine might run in the range of, I believe, $2 to $5 million over a number of years, approximately 5 years. If that were undertaken for every different alloy that uses cobalt in a jet engine, which could run to tens of hundreds of alloys, it could be a very expensive program. It's a case where a decision has to be made where the greatest opportunity is for the development of a new alloy.

The most promising areas look to be in the stainless steel substitution area, where a number of reduced chromium alloys containing 12 percent chromium, instead of 18 percent as used in stainless steel, that it was those areas where targeted work on a few alloys could produce the greatest contribution to reduction of chromium needs. The cost of such a program would be less than the qualification of an alloy for a jet engine.

Beyond that, it would depend on how many alloys were selected to be used in such a program. There is no single alloy available that can have the broad application that stainless steel has. The type 304 stainless steel, which is the largest consumer of chromium, is used widely because of its low cost and excellent performance characteristics. There are alternatives that may even be economic in particular applications, but as long as 304 stainless is known to work and is well integrated into the production operations and has a low cost, those alternatives won't be undertaken by private industry. But the cost for a few materials can be in the order of a few million dollars.

Mr. Lewis. Thank you.

Thank you, Mr. Chairman.

Mr. Brown. Mr. Packard, do you have any questions?

Mr. Packard. No questions.

Mr. Brown. You're sure you don't want to say something, Mr. Fletcher?

Mr. Fletcher. No; thank you very much, Mr. Chairman.

Mr. Brown. Well, I want to thank both of you for appearing here this morning. We will look in more detail at your report. I'm sorry that I didn't have the details fresh in my mind, but we do appreciate the contribution that you have made this morning, and if we have further questions we'll call on you in writing. Thank you very much.

Mr. Antrim. Thank you, Mr. Chairman.

Mr. Fletcher. Thank you.

Mr. Brown. Mr. Lewis?

Mr. Lewis. Mr. Chairman, Mr. Perry Pendley, the former Deputy Assistant Secretary and former Acting Assistant Secretary for Interior on Energy and Materials has substituted a statement for the record. I would like to move that we accept his statement.

Mr. Brown. You don't need to move. We'll do it by unanimous consent.

Mr. Lewis. Thank you.

Mr. Brown. Without objection, so ordered.

[Material to be supplied follows:]

Testimony of

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before the

Subcommittee on Transportation, Aviation & Materials

of the

Committee on Science and Technology

of the

United States House of Representatives

October 10, 1985

Mr. Chairman, my name is William Perry Pendley. I am a partner with the Washington, D.C. metropolitan area law firm of Comiskey & Hunt.

Over the past nine years I have worked in the energy and natural resources field: as an attorney to U.S. Senator Clifford P. Hansen (R.-Wyoming), ranking member on the Energy and Natural Resources Committee; as an attorney to the U.S. House of Representative's Interior and Insular Affairs Committee and particularly its Mines and Mining Subcommittee; as a consultant to the Secretary of the Navy and as a Deputy Assistant Secretary and Acting Assistant Secretary of the Interior for Energy and Minerals. During that time, I have been particularly involved with the matter of strategic and critical minerals, co-authoring a number of Committee reports on the subject while I was with the

Congress, and serving as the lead Administration official for the development of a national minerals policy while I was with the Executive branch.

I come before this Subcommittee this morning as a concerned American, as one who has served this distinguished body and the other House as well, and as one whose responsibilities have included the issues before you today. I come before you representing no client or administration, but instead seeking to bring forth a perspective which I hope will assist in shedding some light upon this matter on which there is so much heat.

I congratulate you Mr. Chairman for initiating this important inquiry and for seeking to place on the record the facts regarding an important--but not the exclusive--component of a national minerals policy. I hope that this hearing will be the beginning of an important national dialogue on this subject, a dialogue which will guide our nation's actions.

The availability of strategic and critical minerals has been a matter of national concern for decades. It was President Eisenhower, the army general who understood the critical need for materials during wartime who adopted the nation's first national minerals policy. Years later, President Carter, in 1977 and at the urging of a number of Members of this body initiated a national minerals policy review. In September of 1980, former Governor Ronald Reagan announced the need for a national minerals policy and the formation of an advisory panel--on which I served--which, in part, led to the President's announcement in

April 1982 of a national minerals policy.

Congressional calls for recognition of the critical role of minerals in our society have been consistent. The Mining and Minerals Policy Act of 1970, and the Mining, Minerals Policy and Research and Development Act of 1980 both sought a unifying policy construct which would end minerals uncertainty and vulnerability. The action of this Committee led last year to the adoption of the National Critical Materials Act of 1984 through which a National Critical Materials Council would be established to coordinate minerals and materials policy and programs among various federal agencies.

The goal of any such policy, and I believe the goal of these hearings today, is first and foremost to ensure that America's critical resource needs are met. An important but subordinate part of that policy is to ensure that whenever possible our resource needs are met by a viable domestic minerals industry. As desirable as are the numerous objectives of a diverse nation such as ours, we cannot permit short-sightedness or ignorance to jeopardize our national security or our economy by acting in conflict with our essential natural resource needs.

The nation understands and its leaders appreciate that the world is a different place than it was 12 years ago, that is, before the energy crisis. For with that 1973 oil embargo, and the dislocation and distress that it caused, came a fundamental change in energy geopolitics. Suddenly, and continuously since then, energy became a matter of national concern that affected not only national policies and programs but our international view as well. After 1973, the Middle East and our view of it has never been the same.

Today, with energy prices softening and falling, with the Organization of Petroleum Exporting Countries faltering and fading, we are still importing as much oil from foreign sources as we were on the day before the embargo. Only the price has changed. Today it costs us a billion dollars a week to import that energy--and that dollar amount alone constitutes nearly half of our nation's trade deficit.

One other thing has changed. Our view--and the foreign policy which flows from it--of the countries which make up the Middle East, whether monarchy, totalitarian regime or fledgling democracy, is influenced by our need for oil. Every report of an attack on Kharg Island, at the head of the Persian Gulf, sends shock tremors throughout the western world.

Yet despite nearly fifty years of minerals concerns, the public remains only scarcely aware of a similar dependence and vulnerability with regard to strategic and critical minerals. Few public policies have been influenced, or previously selected courses of action altered, by the realities of America's critical need for mineral resources.

One of America's richest potential supplies of cobalt lies within a Wilderness in central Idaho, and while Congress has indicated that mining is permissible in that unique circumstance, the mining of the deposit is made difficult by its location in that Wilderness. An area in Missouri possessing our nation's largest deposit of lead and zinc--90% of U.S. reserves--has been classified as Wilderness making further discoveries and development impossible. Vast areas of western states--whose geological anomalies yield ruggedly beautiful country and rich mineral deposits--have been placed off-limits to mineral exploration and development. At the same time the one effort of the Department of the Interior to make more multiple-use land available for just such exploration has been challenged in a federal court.

The United States participated in and contributed to a $268 million Inter-American Development Bank loan to Chile--part of a $760 million copper expansion--while U.S. copper producing capacity had been cut by 45%.

Superfund legislation, now pending before Congress, which seeks to end the continuing threat of toxic waste sites--a universally desired objective--currently includes a heavy tax on mineral producers. This tax, combined with the other burdens on an already beleaguered sector of the economy, may drive more producers from the market place.

Thus it is that our conflicting and multiple policy objectives frustrate the achievement of a national minerals policy. We have, it seems, too many balls in the air at one time. Unfortunately, the one ball that many consider most important to our ability to defend ourself and our allies, the one essential to the survival of an modern society, is the one most frequently dropped.

Today, as we review our policy toward the Republic of South Africa in light of our own needs and those of our allies for strategic mineral resources from and through that nation, we must ensure that our foreign policy objectives are consistent with our national minerals policy objectives. Too often such has not been the case. Here today, working together, perhaps you can ensure that they will be consistent.

The numbers are well known and frequently cited, but they bear repeating:

Manganese--an ore without which steel cannot be produced; a mineral for which there is no satisfactory substitute--is found almost exclusively in South Africa and the Soviet Union. Ninety-one percent (91%) of world reserves are within those two countries. Approximately 39% of U.S. manganese consumption comes from South Africa. There is no domestically available source--99% of the entire U.S. supply comes from foreign countries.

Chromium--indispensable in the production of stainless steel--lies almost solely beneath South Africa and Zimbabwe. Ninety-five percent (95%) of world reserves are in those two countries. Seventy percent of U.S. supplies come from South Africa, Zimbabwe or the Soviet Union. There are no domestically available sources--82% of the entire U.S. supply comes from foreign countries.

Platinum--vital in catalytic convertors and in oil refining--has 98% of its reserves in South Africa or the Soviet Union.

From 1980-1983, 62% of U.S. consumption came from South Africa or Russia. Although at least one U.S. deposit looks attractive, today 91% of the entire U.S. consumption comes from foreign countries.

Cobalt--a critical hardener of steel, especially in hard facing and high temperature environments--has 56% of its world's resources located in Zaire, Zambia, Cuba and Russia. Today, U.S. deposits are sub-economic, resulting in the U.S. importation of 95% of our consumption from foreign countries.

Additionally, our allies in Europe and Japan are much more dependent than we are upon these foreign sources of supply. The free world, therefore, depends upon central and southern Africa for the resources that make our economies grow and prosper, the resources that ensure our ability to keep the peace and preserve our freedom and the resources that help to maintain our standard of living.

I will leave to others any characterization of the reliability of South Africa as a supplier of these critical mineral resources. Suffice it to say, that, in the past that nation has been a consistent, modern, efficient, and low-cost producer of these valuable mineral commodities. I believe that nation's ability to continue as such into the future depends not on that a country's actions or inactions but rather on the course we now choose in setting our national priorities for the achievement of humanitarian goals and objectives. I believe, as desirable as such humanitarian goals are, as universally as they are shared by all Americans, that their attainment must be tempered by and balanced against the needs of U.S. citizens.

I would agree with the government witnesses heard by this Committee today who have described the effects of a potential cut off of central and southern African mineral supplies as "acute" or "profound." While economists can theoretically project that the major price increases that would follow such a cut-off would lead to rapid expansion of production of other sources of supply, as well as quick and efficient utilization of substitutes, such is not necessarily the case.

Even assuming other producers of manganese, chromium, platinum vanadium and cobalt, were technologically capable of massive expansion of ore production at the mine site--a dangerous assumption given the high-grading underway at some of these facilities--the question remains whether such producers would chose to expand. After all, such production increases would create downward pressures on prices, prices which may have been low for years. In addition, expansion would significantly increase capital requirements and owner risk, a risk that many might be unwilling to take, particularly if central and southern African minerals might soon return to market.

Substitution is not the panacea some would have us believe. In the critical minerals area, forced substitution can involve real costs, not necessarily in the use of other, more costly materials--which after all make up a relatively insignificant portion of the unit cost--but in substantial decreases in efficiency and effectiveness.

The Office of Technology Assessment ("OTA"), in its report: "Strategic Materials: Technologies to Reduce U.S. Import Vulnerability," sets forth a series of technological initiatives which OTA argues could be used to lessen the requirements for strategic materials from foreign sources. Yet each of these technological undertakings involves substantial costs, for example: government funding of demonstration and pre-commercial development of alternative technologies and materials; government subsidies, purchase commitments, and loan guarantees--all of which the OTA Report admits to being "expensive" and needs to be "carefully considered" before being implemented; and increased government research on theories of mineral occurrence with more intense study of the resources on Federal lands.

What is remarkable about these alternatives, is not their proposal, for they probably are the only alternatives available, but the fact that we would find ourselves contemplating them at a time when the number one national domestic priority is reducing the budget deficit. The costs of that course of action, the course which we now find ourselves considering, are substantial. The question then is where does the money come from to fund such a project or series of projects when the world has a wealth of mineral supplies that could, and presently does, much more cheaply, efficiently and effectively meet our needs.

We find ourselves in this position because of our growing dissatisfaction with the internal policies of the foreign nation which is our prime source for most of these minerals and what we project as the possible long-term prospects for that country. The question that we need to answer is, can we as a nation afford such a course of action? Is it fair to us and to our citizens given the substantial additional costs, dislocation, economic distortion and deprivation that would result? Wouldn't the better policy be, the undertaking of all reasonable efforts to ensure that South Africa continues to be a strong and viable trading partner and the principal source for the strategic minerals so vital to the western world?

Such a course of action would not be unlike our current practice with regard to other nations. We trade with the Soviet Union. California imports 108,000 barrels of oil a day from Marxist Congo--the nation which, according to the Washington Post, disagrees with the United States in votes at the United Nations more often than does the Soviet Union. We produce oil in Communist Angola, helping, in the words of an article appearing in the Washington Post, to "keep a ruthless government afloat." The U.S. Government is sending its engineers to the People's Republic of China to assist in the construction of massive western style water projects.

What then am I suggesting that we do? Where do we go from here? We must continue to plan for various contingencies; we must maintain an effective, adequate stockpile for national defense purposes; we must continue the research and development programs currently ongoing within our government--now better coordinated under the President's Council; we must encourage recycling, substitution, and conservation in the ordinary course of business, realizing that it is the marketplace and not government that makes such alternatives feasible and likely; we must seek diversification of our sources of supply by making federally owned lands--both onshore and offshore--available to America's entrepreneurial spirit.

Finally, I am suggesting that we as a nation must not permit a national foreign policy position to evolve, which causes us to act out a self-fulfilling prophesy--a prophesy in which we and our citizens are the losers. Under no circumstances can we now, or in the foreseeable future, afford the loss of South Africa as a secure source of supply of strategic minerals.

Mr. Brown. Thank you very much. That concludes the subcommittee's hearings.

[Whereupon, at 11:25 a.m., the subcommittee recessed, to reconvene at the call of the Chair.]